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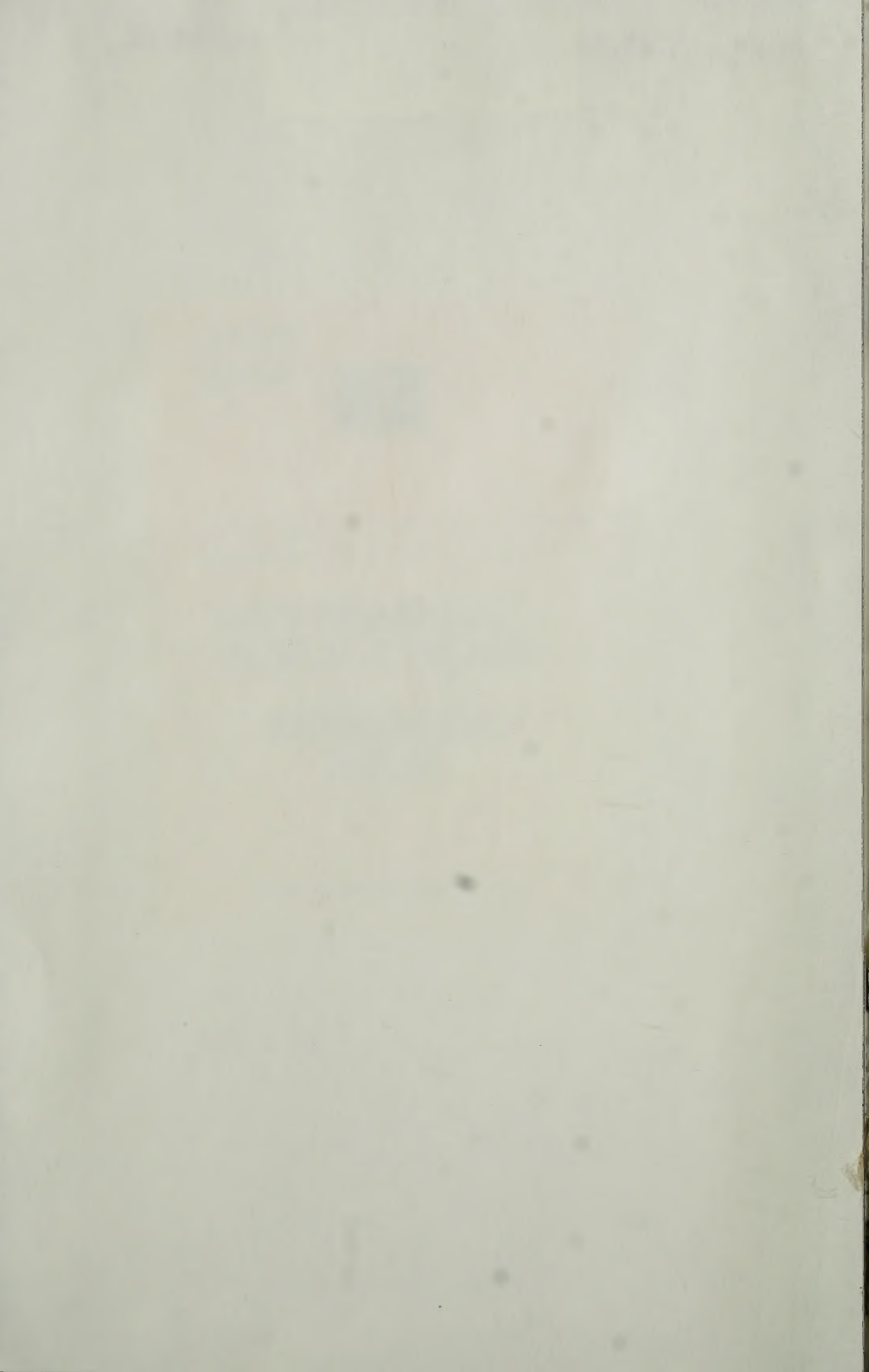
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APPENDIX TO THE JOURNALS
OF THE
SENATE AND ASSEMBLY

OF THE
TWENTY-EIGHTH SESSION

OF THE
LEGISLATURE OF THE STATE OF CALIFORNIA.

Volume V.



SACRAMENTO:
STATE OFFICE, : : : J. D. YOUNG, SUPT. STATE PRINTING.
1889.

APPENDIX TO THE JOURNAL

STATE AND ASSEMBLY

FOR THE YEAR 1880

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Volume V



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- 2—Third Biennial Report of the State Board of Horticulture.
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FROM THE FIRST SETTLEMENT
TO THE PRESENT TIME
BY
JOHN HUTCHINGS
OF THE BOSTON BAR
IN TWO VOLUMES
VOL. I.
BOSTON: PUBLISHED BY
J. B. ALLEN, 1825.



No. 11.—*Pinus ponderosa*, Dougl.—Yellow Pine, near Shasta. Alt. 4,000 feet.

SECOND BIENNIAL REPORT
OF THE
CALIFORNIA STATE BOARD OF FORESTRY,
FOR THE
YEARS 1887-88,
TO
GOVERNOR R. W. WATERMAN.

MADE IN ACCORDANCE WITH THE PROVISIONS OF SECTION FIVE OF AN
ACT "TO CREATE A STATE BOARD OF FORESTRY, AND TO PROVIDE
FOR THE EXPENSES THEREOF," APPROVED MARCH 3, 1885.



SACRAMENTO:
STATE OFFICE : : : J. D. YOUNG, SUPT. STATE PRINTING.
1888.

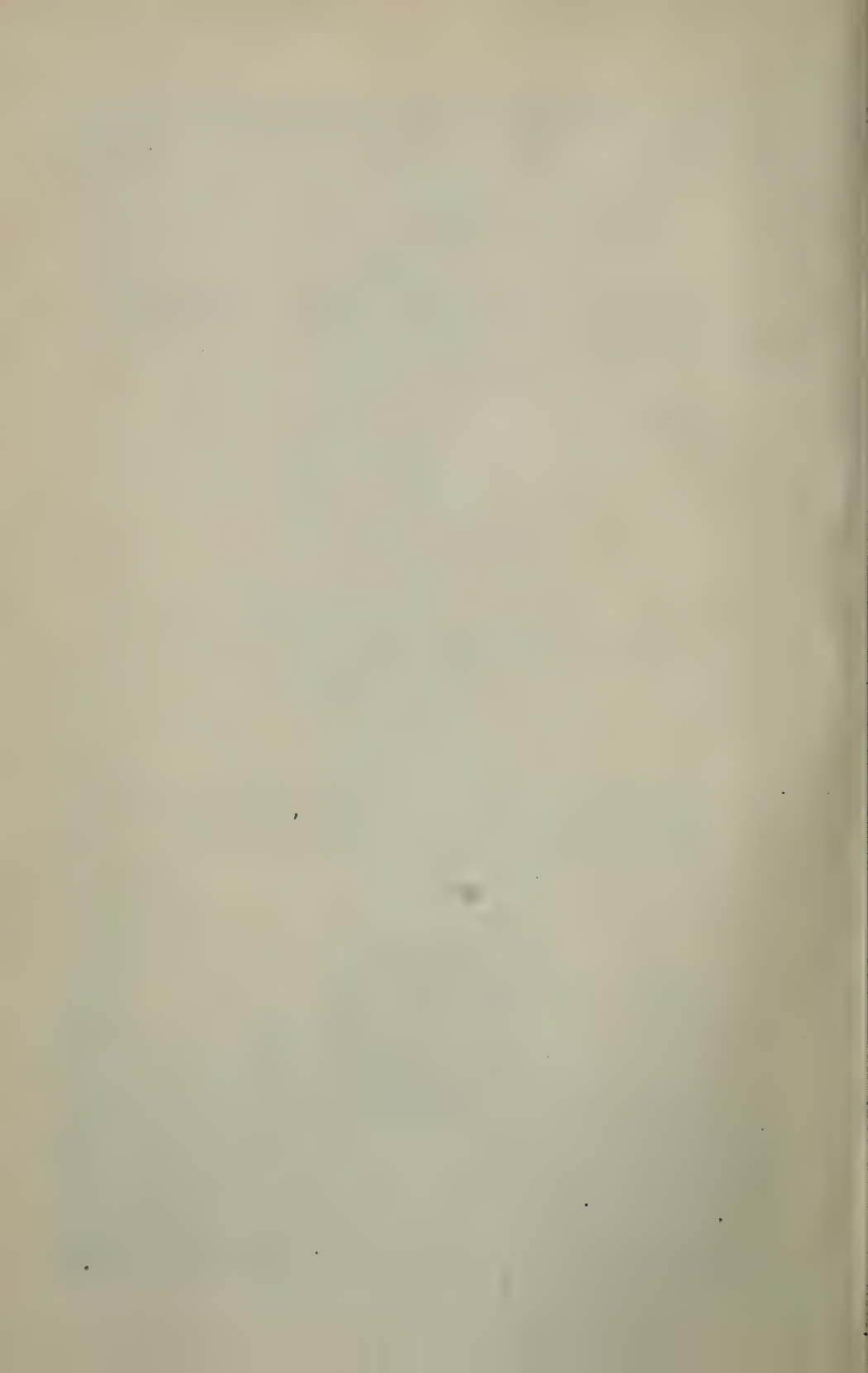


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AN ACT TO CREATE A STATE BOARD OF FORESTRY, AND TO PROVIDE FOR THE EXPENSES THEREOF.

[Approved March 3, 1885.]

The People of the State of California, represented in Senate and Assembly, do enact as follows:

SECTION 1. There shall be established a State Board of Forestry, consisting of three persons, appointed by the Governor of the State.

SEC. 2. Each member shall hold office for the term of four years, and until his successor shall be qualified.

SEC. 3. The Board may appoint and prescribe the duties of its Secretary, and elect one of its own members Treasurer, both to hold office at the pleasure of the Board.

SEC. 4. The duty of the Board shall be to collect statistics and other information with regard to forestry, tree culture, and tree preservation, throughout the State; to correspond with various forestry societies and individuals, for the purpose of obtaining such information; to learn by investigation and experiments the adaptability of various trees to the different sections of the State; to disseminate such information throughout the State in such a manner as to aid and encourage the purpose for which this Board is formed; to assist in enforcing and carrying out all national and State forestry laws, as far as practicable; to act with a special view to the continuance of water sources that may be affected in any measure by the destruction of forests near such sources; to do any and all things within their power to encourage the preservation and planting of forests, and the consequent maintenance of the water sources of the State.

SEC. 5. This Board shall report biennially to the Governor a detailed statement of its work, which shall include all disbursements that may have been made. All printing required to be done by the Board for their official use shall be done by the Superintendent of State Printing.

SEC. 6. There is hereby appropriated for the use of this Board, out of any moneys in the State Treasury not otherwise appropriated, the sum of five thousand (\$5,000) dollars for the two years beginning the first of April, eighteen hundred and eighty-five; said sum to be used for the payment of the salary of the Secretary, not to exceed the sum of one hundred and twenty-five dollars per month, the necessary traveling expenses of the members of this Board, the employment of assistants, and such other needful expenditures as this Board may incur, and the State Controller will draw his warrants on the State Treasurer in favor of the Treasurer of the Board for the same.

SEC. 7. The members of this Board shall receive no compensation.

SEC. 8. All Acts or parts of Acts in conflict with this Act are hereby repealed.

AN ACT TO ENLARGE THE POWERS OF THE STATE BOARD OF FORESTRY, AND TO PROVIDE FOR THE EXPENSES OF SAID BOARD.

[Approved March 7, 1887.]

The People of the State of California, represented in Senate and Assembly, do enact as follows:

SECTION 1. All the members of the State Board of Forestry of this State, and all assistants now employed or hereafter to be employed by said Board, are hereby endowed with all the powers of peace officers, for the purpose of making arrests for any violation of any law applying to forest or brush lands within this State, or prohibiting the destruction thereof.

SEC. 2. There is hereby appropriated for the use of this Board, out of the moneys in the State Treasury not otherwise appropriated, the sum of twenty-nine thousand five hundred dollars for the two years beginning the first of April, eighteen hundred and eighty-seven, said sum to be used for the payment of the salaries of the assistants of said Board, the necessary traveling expenses of the members of said Board, and such other needful expenditures as said Board may find necessary, and the State Controller shall draw his warrant on the State Treasurer in favor of the Treasurer of the Board for the same.

SEC. 3. This Act shall take effect and be in force from and after its passage.

REPORT

To his Excellency R. W. WATERMAN, Governor of California.

The State Board of Forestry of California has the honor to present its second biennial report, showing the scope of the work undertaken and the results achieved. From the separate reports of the officers herewith submitted, a complete detailed account of all the work done may be obtained.

The first efforts of the Board of Forestry during the period covered by this report were directed toward a reform in the cutting of the public forests on our mountain watersheds. The generosity of the General Government in the management, or lack of management, of its forest lands, and of the State with its school lands, had long been grossly abused. Individuals, companies, and corporations cut timber pretty much where they liked, and without obtaining title, as the law requires, to the lands cut over. The result was that the Government and State, in a large number of cases, obtained nothing for their forest lands, and the people, the real owners of these lands, did not receive their due. In other numerous cases some payment was made, the timber stripped off, title never completed, and the lands abandoned after being made worthless. Another effect of the system was the encouragement of wasteful and shortsighted methods of lumbering. Whenever the lumbermen did not own the lands over which they were cutting, they very naturally planned their work for to-day only, without regard for the future. Everything in sight at all available was cut, and the waste left so that the fires sure to follow would, with so much material, destroy all seedlings and young trees remaining. No one thought of a scientific forest management, with a view to permanently maintaining our mountain forest lands for forest purposes.

Under the old conditions waste, destruction, and violation of law were rife. Conscientious lumbermen were at a disadvantage, and the abuses spoken of had become so general that few persons considered them improper. The activity of the Board in attempting a reform, and the consequent investigations of the Government, have had a most gratifying result.

The attorney and head of the special service, Mr. E. L. Collins, and the special agents have been active in investigating abuses, and especially in advising and warning interested parties against illegal and improvident practices. As a consequence the lumbering industry is changing its methods. Illegal acts have greatly diminished as their cause has been removed. At this time, practically, all the lumber being cut is upon private land. The change in ownership is shown by the following table:

NAME OF OFFICE.	Total Number of Timber En- tries to May 1, 1888.	Number of Timber En- tries since Jan. 1, 1887.
Independence Land Office.....	90	2
Humboldt Land Office.....	1,775	220
Los Angeles Land Office.....	339	198
Marysville Land Office.....	460	327
Sacramento Land Office.....	509	116
Shasta Land Office.....	550	296
San Francisco Land Office.....	3,100	1,000
Stockton Land Office.....	305	188
Susanville Land Office.....	162	84
Visalia Land Office.....	743	140
Totals.....	8,033	2,571

It will be seen by this table that the timber entries in the last sixteen months to May 1, 1888, have been about one third in amount of all the timber entries heretofore made in this State. The State school lands in timber have also been very rapidly taken up, and now there are no timber lands of value belonging to the schools in the State.

The School Fund has thus been much benefited, where formerly the lumbering interest paid little or nothing to it, and left the school lands cut over worthless. In the interest of the public schools this Board would respectfully suggest a change in the present law regarding payments for school lands. As the law now stands all payments after the first are at the pleasure of the Legislature.

The management of the forests by the lumbermen, since their increased and general ownership of the timber lands, has greatly improved, and they are in many cases looking to a permanent forest crop from lands formerly considered good for but one cutting.

Our agents have posted fire notices, setting forth the law in regard to the setting of forest fires, throughout the mountains of the State. They have also aided the County District Attorneys in securing evidence against fire setters.

That these agents have done good seems to be conclusively shown by the petitions sent in to reappoint agents, where from lack of funds we had been obliged to discontinue them. These petitions have been signed by merchants, bankers, public officers, and influential citizens. The damage done by forest fires is so considerable every year in this State that agents should be sent out each season to post warning notices with the law against fire-setting, and to show the careless and malicious that some one is looking after such violators of law. We believe that the fires thus prevented have saved the State more money than ten times the whole sum used by the Board.

A very important question for the interests of the State is the protection of the great mountain watersheds, from which the springs and streams used for navigation and for irrigation derive their supplies.

The destruction and extinction of forests upon steep mountain sides has been a frequent occurrence in the history of civilized countries. One certain consequence has invariably flowed from such conduct. Districts so treated have become progressively dry and arid. Springs and streams have diminished in permanent flow of water, or have altogether dried up. Fertility of soil and returns to agriculture have diminished, together with population and wealth. On the other hand, such rains as fall tend to become diluvial in character. The mountain watersheds, deprived of

all means of detaining the rainfall, shed it like a roof, and destructive torrents form, cutting away good lands in one place and covering others with the rough debris of the denuded mountains. The debris of the hydraulic mines in this State is infinitesimal and innocent in its damages to what must occur if the high Sierras are unduly denuded of their forest covering. In such case the rains must flow off more rapidly and the snows melt more suddenly than at present. Thus the perennial value of the streams for irrigation must diminish, and sudden and destructive floods are certain to occur. The history of such countries as Palestine, Persia, Greece, North Africa, Spain, and the south of France demonstrates the results of unwise forest extinction, especially upon mountains. In the single valley of the Durance two hundred thousand acres of fertile valley lands have been covered by the debris and torrents of the denuded watershed of that river. That California will prove no exception to the rule is shown by the instances of the diminution of springs and streams, and the formation of torrents in this State, due to forest destruction, collected and presented with time, place, and witnesses in our last report.

Now that these mountain watersheds in forest, so important to the irrigators, farmers, and consequently to all persons in the State, have generally passed into private hands, there seems but one way left to deal with the question; this way is by education of the people to demonstrate that a wasteful and unscientific destruction of forests upon certain critical points of important watersheds, while temporarily beneficial in a few thousand dollars to some individuals, threatens millions of dollars of property to others. Thus the carelessness or improvidence of one man in the mountains may destroy the property and the means of livelihood of thousands of his fellow citizens in the valleys below. This point established, legislation in the line of the forestry laws of other experienced and civilized countries can be had. We will then have a reasonable regulation of lumbering methods upon important watersheds of the State, with a view of preserving the integrity of our springs and streams for the productive interests of the State. No doubt a cause of action would lay against any one who by such use, even of his own forest property, did damage to his neighbors, either by diminishing their water supply or by so suddenly augmenting it in the form of torrents as to destroy their property. Such remedy will be the State's last resort, and can only be relied on after great damage has been done. Wise measures should prevent such serious injuries to the people.

The active attention of the Board has been given not only to the preservation of our forests, but also to the planting of trees for economic and ornamental purposes. Our native trees have been too much neglected, but with the exception of the Monterey pine they are generally of slow growth, especially in dry situations. The foreign trees introduced have disadvantages in most cases, and that extraordinary grower, the blue gum of Tasmania, is not capable of supporting the frosts of many of our interior points, nor the excessive drought of others. It happens that the very places where trees would be of the greatest advantage are those where the trees usually relied on for planting, will not succeed or do but poorly.

The Board has endeavored to remedy this condition by the introduction of other trees suited to the more difficult climates of the State. After extensive correspondence, the Board felt justified in recommending several trees as being better able to resist excessive drought and to grow with reasonable rapidity than any we had hitherto tried. The trees recommended were the locust, catalpa, eucalyptus viminalis or manna gum, the eucalyptus leucoxylon or blue gum of South Australia, and the eucalypt-

tus corynocalyx or sugar gum. Taking all things into consideration, the last is probably the best. Our recommendations were largely based on the experiments of the Forest Department of South Australia, under the able direction of Mr. J. Ednie Brown. His department had planted a number of stations with trees, in the dry interior of Australia, where the climatic conditions bear a close resemblance to those in the drier portions of our own State. While in these extreme stations the blue gum of Tasmania (*E. globulus*) did not do well, the other trees named flourished beyond expectation. These trees, and even their seeds, were not to be had in this State. The Board therefore imported seeds from Australia, and distributed them free throughout the State. Many successful plantations are the result.

No tree has been found to grow more rapidly in situations suited to it than the common blue gum. Experiments by a member of the Board show, however, that there are other trees not very inferior in this respect while much more valuable in others qualities. Two trees planted from the pot, six inches high, in the middle of August a year ago, at Santa Monica, nineteen months from the seed and fourteen months from the transplanting, are now, respectively, fourteen feet six and a half inches and fourteen feet six and three quarters inches in height. One of these trees is a eucalyptus corynocalyx (sugar gum), and the tallest a eucalyptus viminalis (manna gum). A tree of the eucalyptus gomphocephala (tooart gum) of the same planting is fourteen feet one inch high. It must be said, however, that the soil and climate at Santa Monica are especially favorable to almost all forest trees. The Board calls attention to a paper in this report by the new head forester, Mr. W. S. Lyon, on the trees found best suited to our different climatic belts in California. We hope in a few years that our experimental stations will enable us to give complete and reliable records as to the availability of any tree to any section of the State.

The great variety of climatic and soil conditions in this State, together with the impossibility of procuring through private means any reliable experimental records as to tree growths in these different belts, has been a handicap to this Board from the first. Correct advice in tree planting could not be given without some record of this kind. Letters requesting the advice and information form a large portion of our correspondence.

To supply this demand the Board decided to establish experimental stations in the different climatic belts of the State, and to make these plantations of trees in such ornamental form as would delight as well as instruct the people. Our plan is to keep an accurate record of temperature, rainfall, etc., and of the growth and condition of each variety of tree planted in each separate station. We had no funds, but the enthusiasm of the officers and the faith of the people have supplied us beyond all expectation with splendid stations. Generous donations of land have been made, and the Board of Forestry now has valuable stations at Santa Monica, Chico, Merced, Hesperia, and San Jacinto, and has promises for two other stations. The largest of these stations is one hundred acres in extent, and the total value of all of them is between seventy-five and one hundred thousand dollars. The nurseries of forest trees already established at the Bidwell station, Chico, and at the Santa Monica station, are estimated to be worth, according to ordinary values, from seven to ten thousand dollars. The Board respectfully submits that such an acquisition of property to the State by deed, shows beyond doubt the growing appreciation of the value of forestry by the people of California, and that the Board has returned three dollars in property to the State for every one it has received in this respect only.

The plan of the Board is to plant these stations in park form, while also having all the trees properly labeled and catalogued, so that the people will be charmed by the beauties of these parks, and at the same time instructed by the information they will give as to the capacities of different trees in our different soils and climates.

Golden Gate Park, in San Francisco, practically without features of instruction, receives more than \$100,000 a year, and is of inestimable value to the citizens of that city. The experimental parks of this Board, if properly supported and carried out, will have the same and an additional value to the residents of the State where they are situated. Besides this, they will add greatly to the attractiveness of the State itself. Few places in France are more generally visited than the botanical gardens at Paris; in England, than the gardens at Kew; in Germany, than the Thier Garten, near Berlin, etc.

In these parks scientific tree culture is the main feature. Our experimental stations in California, owing to our climate, can be made both more useful and more attractive than any of them. It seems certainly advisable to show by such State institutions what the different parts of the State are capable of in tree culture. These stations will do this by actual visible experiment to show what will succeed, and by reliable record to show what will not succeed, and thus save time and expense to the citizens, all the time attracting the settler by the beauties demonstrated in the park itself as a capacity of California. From the nurseries already started the Board is distributing forest trees suitable to the State—trees, for the most part, impossible to obtain elsewhere. Such a beautiful and useful tree, and one that does so well in ordinary situations, as the eucalyptus gomphocephala, or tooart gum, can be obtained in quantities nowhere outside of the forestry nurseries. The Torrey pine is another such rare and valuable tree now doing well at the forestry stations.

In our last report we published the first series of our forest map of California. This map was made by actually surveyed section lines, and was absolutely accurate. By it one may know what lands in California have trees or brush on them, what the trees are in each section, and the density of the growth. We have continued this most valuable map, for which we have received so much commendation, and added a new feature. We now represent the principal timber growth in colors. The accompanying report of the engineer of the Board, Mr. H. S. Davidson, will be found of interest and value.

This year the Board has commenced another great work. This is the scientific and popular description of the forest trees of California. Illustrations of the different trees will accompany this report, and enable even an amateur to recognize our native forest trees, and thus add a wonderful interest to all visits to the forest. This year will complete the story of the pine trees of California. This interesting family of trees contains more species in California than are found in any similar area in the world. Amongst them are those bearing the largest cones known, and those bearing the smallest. The largest pine trees of the world are here. Another peculiarity is the extremely small range of some species.

The Board has been fortunate in securing the services of the distinguished botanist, Mr. J. G. Lemmon, and of his accomplished wife for this great work. Properly executed it will make our reports standard books for the forest flora of this State, and give a complete and united description of our trees nowhere else to be found.

The Board in all its work has been obliged to break roads for itself. Forestry work in this State is new. Men willing and capable of taking hold

of it are hard to find, and our laws and social system are different from those of countries where forestry is now practiced. Our climatic and topographical conditions are also unlike those of any locality where scientific forestry is the rule. For these reasons precedents for forestry action in California have no practical existence. The Board has thus been at a disadvantage in its work. Some indulgence therefore should be extended where it has not accomplished as much as it desired and as much as the true forest interests of the State demanded, while on the other hand a fair and reasonable recognition should be given to the important work completed or commenced under such adverse circumstances.

Tree planting for profit or for ornament will add here a value and there a beauty throughout the State, but it is the integrity of the mountain forests, where our streams and springs have their sources, that is vital to the interests of California. The peculiar configuration of the State, with its long, high ranges of mountains parallel to each other, its situation on the Pacific, with a dry and wet season, all combine to make California a locality certain to suffer as much from unwise forest denudation as any country hitherto ruined by such folly. This Board is thoroughly convinced that judicious legislation looking to the preservation of the fertility of the valleys of California by preserving their water supplies should be had. Nothing is of greater moment to the people of this State than an intelligent and firm forest policy. The Forest Commission of the State of New York has more immediate opportunity for doing good, owing to the large State ownership of forest lands and its large annual appropriation, than any other in this country, not even excepting the National Department of Forestry.

Mr. Bernardt E. Fernow, the head of the national forestry work, is a most intelligent and capable man, who has done and is doing much to bring forestry matters before the public with a view of securing Congressional action. Such action is seriously needed at once. Every day's delay makes proper forestry measures more expensive and more difficult. The condition of the nation in regard to forestry may be compared to the story of the Roman republic and the sibylline books. Each time these books of prophecy were offered to the Romans and refused a certain number were destroyed. When they were at length purchased the price was enormous and the books were but a fractional part of what they had been. Thus it will be with forestry, and forestry must come some day.

Good work in forestry has been done in many States. Our results in California we believe will compare favorably with those in any of them. Our report has been extensively quoted, and even so late as this year a whole article has been copied from it. Our report herewith presented will, we believe, be of more permanent value than any official forestry document ever issued anywhere.

The work of the Board has been made possible by the activity and enthusiasm of our officers. We thank them all. The aid and advice offered to us by the national forest officers, by foreign forest officers, especially by the Forest Department of South Australia, and by public spirited citizens, such as Mr. Adolph Sutro, Mr. Joaquin Miller, and others, is highly appreciated, and we extend our hearty thanks to all of them.

The Board has lost since our last report two members by death. Both were distinguished men. Professor A. Kellogg was for many years an eminent scientific worker in the State; an industrious and capable man, he was a loss not only to forestry, but to the State. In Hon. James Bettner the cause of forestry lost a careful business man, intelligent and public spirited on all subjects, and an especial friend of forestry.

The Board has also lost by resignation the first man who took a practical interest in this vital subject, and to whom the State is indebted for the present Board of Forestry. Hon. James V. Coleman found his private affairs so pressing that he was obliged to give up the work that he had so auspiciously started. All connected with the Board have regretted Mr. Coleman's resignation, but we count on his promise to still take a lively, though unofficial, interest in forestry.

The Board recommends that the unsold school lands in brush and forest be reserved from sale and placed under the management of the State Board of Forestry; providing, that all money derived from the sale of timber, pasture privileges, or other sources shall be turned into the State School Fund. It is also recommended that the legislation on forestry suggested by the attorney of this Board be made law.

At the last session of the Legislature a concurrent resolution was passed, praying the National Congress to immediately reserve all Government lands in forest in California from sale, with a view to their permanent preservation as a forest reserve for the protection of the watersheds of the State. This Board earnestly prays that similar action be again taken, and respectfully suggests the further recommendation that henceforth, by the proper laws, it be forbidden to all persons or corporations to cut timber or wood from the public lands for any purpose whatever without a permit from the State or National Forest Officers, as may be deemed most wise.

ABBOT KINNEY, Chairman,
JOHN D. SPRECKELS, Treasurer,
WALTER S. MOORE,
State Board of Forestry.

REPORT OF THE SECRETARY.

SAN FRANCISCO, CAL., November 1, 1888, }
Room No. 35, Flood Building. }

To the Commissioners of the State Board of Forestry:

GENTLEMEN: I have the honor to submit herewith a report of the business of the office of Secretary for the two years ending November 1, 1888. It is to be regretted that the publication of the proceedings of the Board could not be delayed until the thirty-first of March, 1889, at which date the time of the biennial appropriation will have expired, when a complete statement of the Board's expenditures could have been rendered. The law, however, governing the action of the Commission requires that a report of the Commission shall be presented to his Excellency, the Governor, biennially, and as it is of great importance that this report should also be laid before the State Legislature for consideration, it is imperative that the copy shall be in the hands of the State Printer some weeks before the convening of that body. In consequence of the number and length of the reports awaiting publication, the State Printer should be furnished with copy not later than the first day of November. Hence it is that the financial exhibit herewith presented is only complete as to the transactions between the date at which the last appropriation began to run and the first day of November, 1888.

Since the compilation of the last report of the State Board of Forestry, which was presented to the Legislature convened in January, 1887, death has had much to do with making changes in the personnel of the Commission, and its minutes record the decease of Prof. A. Kellogg and Hon. James Bettner. By the resignation of Hon. J. V. Coleman, the framer of the bill establishing the Board, in fact, we may say, the father of forestry on the Pacific Coast, the Commission also suffered a grievous loss, and forestry matters the earnest workings of one whose heart and soul were thoroughly in the movement. The death of Prof. Kellogg, one of the original members of the Commission, deprived the people of a faithful and conscientious servant and an accomplished scientist. This vacancy was filled by the appointment of Hon. James Bettner, of San Bernardino, who brought to the position the greatest enthusiasm in the cause of forestry and a thorough knowledge of the means to be taken for its advancement. Scarcely, however, had the newly appointed member taken upon himself the duties of his office, barely had he begun to show to the public how earnest and eager he was in the great work of the Commission, when he, too, was called away forever. The vacancy in the Board, caused by the resignation of Mr. Coleman, was filled by the appointment of Hon. John D. Spreckels, and Hon. Walter S. Moore, of Los Angeles, was selected to fill the vacancy caused by the death of Mr. Bettner. These changes, from time to time, necessitated a reelection of the officers of the Commission, who are at the present writing, Hon. Abbot Kinney, Chairman; Hon. John D. Spreckels, Treasurer.

The Legislature appropriated for the uses of the Board of Forestry for the years 1887-1888 the sum of \$29,500, and it was thought at the time



Pinus tuberculata, Gordon.—Knob-Cone Pine, from a water-color sketch by
Mrs. J. G. Lemmon.



that this amount would be adequate for the work to be undertaken. The experience of the past two years has shown, however, that the grandeur of the task in hand has been but hinted at, and that the people are but now beginning to awake to the great importance, not only to themselves, but to the coming generations, of tree planting, tree culture, and forest preservation. From many sections of the State offers have been made to donate large and valuable tracts of land to be devoted to experimental tree planting, and it will be readily understood that the care and cultivation of these parks and plantations will entail much greater expenditures than had been foreseen. The appointment of competent officers, forest guards, and the other employés of the Board necessary to the carrying out of the work of tree planting and preservation, will also require increased funds, and what was thought at the inception of this work very ample provision, must in the future be greatly increased if the efficiency of the forest service is to be conserved.

At the first meeting of the Board held after the last appropriation was made, the question of appointing forest guards was taken up and it was then decided to organize a forestry police, with a paid chief and assistants and volunteer aids. It was then stated that in consequence of the condition of the fund at the disposition of the Board, that it would be necessary to limit the number of forest officers under pay, and to rely in great measure on the good will of volunteer officers. It was thought that the surveyors in the different counties of the State would be especially willing and able to help the Board in a part of the work, and accordingly at the suggestion of the United States Surveyor-General, the following circular was drawn up and sent out:

OFFICE OF STATE BOARD OF FORESTRY, }
SAN FRANCISCO, — — —, 1888. }

To — — —, *Deputy Surveyor*, — — — *County*:

SIR: The California State Board of Forestry has been informed by United States Surveyor-General Hammond that the duties of your position are of such a nature as would permit you to act for the State Board as well as the General Government. It is the desire of the State Board to appoint forest officers in each forest district of the State, but insufficiency of funds renders it impossible to pay competent men for their entire time.

It is desired to have reports on the output of timber; the approximate estimate of timber standing; the damage done by pasturage and fire, and the condition of new forest growth, if any, in the different districts. Officers of the State Board have the powers of Sheriffs and Constables in all cases involving the violations of the forestry laws. Among these is one imposing a maximum fine of \$1,000 and imprisonment for one year for setting fires in any forest lands. The Board also desires to obtain information as to fraudulent land entries in timber districts, or the stealing of timber on State and school lands. If possible, the Board would like to have a full statement of these cases, together with the names of the witnesses, so as to proceed in law against the culprits. If you can perform these duties please communicate with the Board, stating what country you can cover and on what terms you will agree to perform the service required. If you cannot perform these duties yourself, be kind enough to suggest some reliable person who can do so.

SANDS W. FORMAN, Secretary.

In the majority of cases a favorable answer was received to this appeal, and when the party addressed was unable to accept, or rather to tender his services, he was kind enough to suggest some reliable person who was willing to act in his place. In this way the Board succeeded in securing the services of a competent and economical corps of sub-agents in thirty-three counties in the State. Their aid in distributing the fire notices throughout the timber counties, in reporting cases of depredation on State school land or preventing the same, has been most invaluable. In addition to these sub-agents, great assistance was rendered the Board by the officials of the Southern Pacific Railroad Company, who sent to each station master in the State copies of the fire notices, stating the penalty for

starting timber and brush fires, with the directions that the same be posted in a conspicuous place about the depot. And in order that no section of the State might by any chance be overlooked, the Board caused to be prepared and sent out the following circular to the Postmasters of the State:

OFFICE OF STATE BOARD OF FORESTRY, }
SAN FRANCISCO, — — —, 188—. }

To the Postmaster of — — —:

We inclose you two copies of a fire notice prepared by this Board, one of which we would be glad to have you place in a prominent position in your Post Office; the second is to replace the first, should it be torn down or destroyed.

All good citizens are interested in the preservation of our forests and the stopping of the annually wasteful fires that do so much damage throughout the State. We therefore hope for your cooperation in this matter.

ABBOT KINNEY,
Chairman State Board of Forestry.

When the Board had at last satisfied itself that it had secured the services of a reliable and energetic corps of sub-agents it issued a circular of instructions, at the same time sending out over twenty thousand of the canvas fire notices, which are believed to have found their way into every timber township in the State. The instructions to sub-agents read as follows:

OFFICE OF STATE BOARD OF FORESTRY, }
SAN FRANCISCO, — — —, 188—. }

Mr. — — —:

DEAR SIR: You have been appointed a Special Agent of the State Board of Forestry, for the purpose of cooperating with us in the protection of our timber lands. It is necessary to preserve these forests, primarily for future generations. As a large portion of our State is dependent on irrigation for its productiveness, it is also important that our watersheds be adequately protected. This can only be done by a complete reservation of all timber lands among which our mountain streams have their origin.

It is a well established fact that when mountains are denuded of their timber, the springs and streams soon dry up. The rains then descend on the bare mountain sides, passing off as destructive torrents, productive of only injury, instead of good.

It is, therefore, necessary that proper steps be taken to preserve our forests from destruction. In order to accomplish this, we must gain reliable information concerning depredations on our public timber lands. The law does not permit timber to be cut on State or Government lands, unless the same has been entirely paid for. This prohibition, however, does not apply to wood or timber cut for domestic purposes. If you are aware of any illegal cutting of timber in your vicinity, we should like to have you notify us of such, giving the number of the section and township in which it has occurred; also the names of persons responsible for the cutting, together with the names of any witnesses who will testify to the facts in the case. If possible, state approximately the amount of wood or timber cut, and its probable value.

We wish especially to guard against forest fires, and should you ascertain the existence of any, we desire you to learn, if possible, the names of the persons who originated them. We also desire to learn the names of such witnesses as will prove material in a legal prosecution.

Your attention is called to Section 1 of an Act passed by our last Legislature, and approved March 7, 1887, providing for an increase in the powers of the State Board of Forestry:

"All the members of the State Board of Forestry of this State, and all assistants now employed, or hereafter to be employed by said Board, are hereby endowed with all the powers of police officers, for the purpose of making arrests for any violation of any law applying to forests or brush lands within this State, or prohibiting the destruction thereof."

You will observe that by the provisions of this statute, you are clothed with the authority to make arrests whenever you personally witness the illegal cutting of timber on State lands, or the willful setting of any forest fire. In such a case, it would be your duty to turn the offender over to a Constable, and swear to a complaint before a Justice of the Peace for that district in which the offense was committed. If it should appear, from your report to us, that a serious violation of the law has taken place, we will send an agent to your locality for the purpose of making further investigation. When, however, you can gain information concerning any extensive destruction to timber lands, especially forest fires, we shall expect you to improve the opportunity. When possible, we should like to have the statements of witnesses taken in writing, and sworn to by them before a Notary Public.

Should you at any time receive notices to post throughout your county, you will place them in conspicuous places in the leading towns and along county roads.

As to compensation for work performed, we have decided to allow four dollars per day. The amount of funds at the disposal of the Board for this kind of work is very limited. We cannot afford to pay regular salaries, but only for such time as is actually consumed in performing the work desired. Under no circumstances will we approve extravagant claims, and in all cases we must be satisfied that the work has been done as represented.

In presenting to us a bill for services rendered, we shall require a detailed statement of the work performed each day, including time and place. If engaged in posting bills, state the number of bills posted each day, on what roads, and the approximate distance traveled. You must also make an affidavit as to these statements, before a Notary Public, using a blank demand, which we will furnish on application to this office.

Hoping that you will prove of service to us in our efforts to protect the forests of this State, we remain,

Very truly yours,

ABBOT KINNEY, Chairman.

THE EXPERIMENTAL STATIONS.

At the meeting of the Board held July 1, 1887, it was decided to establish an experimental station for tree planting at Santa Monica, for the purpose of ascertaining the comparative value of trees in the interior and along the coast, and at the meeting of the nineteenth of July the following resolutions were adopted:

Resolved, That the State Board of Forestry will receive proposals for the use of tracts of land in the southern, central, and northern sections of the State, to be devoted to experimental tree planting, the said tracts to be placed under the absolute control of the said Board for a term of years hereafter to be agreed upon.

Resolved, That the Board will also receive proposals for the care and cultivation of the said tracts, which are to be laid out and arranged after the manner of parks and public grounds, and to be used for the recreation and instruction of the people at large, under specifications that will be prepared, copies of which may be had on application to the Secretary of the Board.

On the twentieth of December, 1887, the Santa Monica tract, designed for experimental tree planting, was formally accepted, and H. Rowland Lee placed in charge as Head Forester.

At the meeting of the Board held July 20, 1887, H. S. Davidson was appointed Engineer of the Board to complete the forest map of the State commenced by Hubert Vischer, Esq.

At the meeting of the Board held the following day the annexed circulars were drawn up, and the Secretary instructed to send them out at once. That they were productive of immense good, and the means of saving much valuable property, cannot be questioned. They were as follows:

TO LUMBERMEN AND MILLMEN.

OFFICE OF STATE BOARD OF FORESTRY, }
SAN FRANCISCO, ———, 188—. }

To ——— :

DEAR SIR: The importance of the lumber industry is fully realized by the State Board of Forestry. To those engaged in this industry the importance of maintaining a continuous supply of lumber by means of renewed growths must be equally evident. Under the present land laws the honest and legitimate lumber dealer is in continuous competition with the robber and perjurer, who is now so extensively despoiling the Government and State school lands. The land laws are such that strict compliance with them by lumbermen is almost impossible. Owing to the total absence of official supervision destructive fires spread from one district to another to the great injury of the lumber interests, both present and prospective. We should be glad to have your views on this subject, and especially as to our plan. This is, that all of the timber land in the State should now be withdrawn from sale or entry, and the lumber interest provided for by the European system of the sale of the timber alone, leaving the title to the land in the Government, with the responsibility of establishing a new growth as fast as timber is cut. Thus the mountain sides, springs, and streams will be protected, a perennial supply of timber and fuel be maintained, and the necessity of violation of the law in the lumber industry be done away with. Please give us your views.

TO COUNTY BOARDS OF TRADE.

OFFICE OF STATE BOARD OF FORESTRY, }
SAN FRANCISCO, — — —, 188—. }*To the honorable Board of Trade, — — —:*

GENTLEMEN: The State Board of Forestry invites you to coöperate with them in their efforts to preserve the timber lands from the waste now prevailing. The depredations of timber thieves, the ravages by fires started sometimes inadvertently by campers or sheepherders, and often designedly by the latter for the purpose of creating new pasture land, or other reasons; the browsing of sheep upon the tender shoots of young trees, are among the principal evils causing wasteful depletion of the timber resources of the State, and operating to prevent renewal by the efforts of nature. It will be the effort of this Board to put a stop to all unlawful actions operating to the detriment of the State in regard to its timber lands. The many evils that will surely flow from the denudation of our mountains have been repeatedly pointed out. The results upon our irrigation, farming, and navigation interests can easily be predicted from past experience in other countries. They can be but deplorable. The Board is advised that much public timber land is being taken up, by entry or otherwise, by dummies in the interest of speculators, who propose to strip the land ruthlessly, and then abandon it. We ask your assistance to aid us in putting a stop to this practice, and to use your influence in every way to check the waste we have alluded to from other causes. The Board proposes to establish experimental stations in different parts of the State, where, under their supervision, forest trees from other countries will be planted and tested as to their usefulness and adaptability to our soil and climate. It is thought by the Board that such stations might be made attractive and instructive, and that their establishment in any locality will be a benefit to it. We have invited proposals for donations of land to the Board to be used for the purpose indicated, and invite your consideration and support of the project in your locality.

TO COUNTY SHERIFFS.

OFFICE OF STATE BOARD OF FORESTRY, }
SAN FRANCISCO, — — —, 188—. }*To the Sheriff, — — — County, Cal.:*

SIR: The loss of property in the State caused by fire is very great. In the forests destructive fires are now allowed to go unchecked, except occasionally when private interests demand protection. From this cause, as well as owing to the extensive illegal cutting of timber from Government and State school land, the denudation and waste in our forests is great. Thus the property of the public and of the school children is dissipated, the sources of the streams and springs injured, floods alternate with drought, and the whole irrigation interests of the State suffer. The State Board of Forestry desire to alter these conditions, and among its measures is one to form a forestry police. The duties of these officials will be to report fires set in the forests, with all possible evidence, so that we may proceed in law against such violators, and also to report all trespasses and robbery upon the State school lands—section sixteen and thirty-six in each township—and upon the Government land, with the names of witnesses, etc. Our funds will not permit us to pay for the whole time of competent men, but we should be glad to pay liberally for actual work done as indicated. Please send us the name of a reliable man who would act for us in these matters. We thought some deputy in your office, at times when his duties permitted, might undertake such work.

At the meeting of the Board held July 22, 1887, Edward L. Collins was appointed Special Agent of the Board, to collect evidence in cases of depredations on Government and State school land, and to prosecute all violators of the forestry laws. On the twenty-seventh of January, 1888, at the regular meeting of the Board, Mr. A. C. Hibbard appeared in behalf of ex-Governor John C. Bidwell, and invited the Commissioners to visit and inspect a tract of land near Chico, in Butte County, some thirty-seven acres in extent, which would be tendered by its owner, Governor Bidwell, to be used by the Board for an experimental tree planting station. Some days later Commissioners Kinney and Spreckels proceeded to the land in question, and a few weeks after the transfer of deeds was made to the Commission, and a force of men set to work to lay out and improve the new park.

On the thirtieth of April, 1888, the Board met, and removed H. Rowland Lee from the position of Head Forester, and appointed in his place Thos. H. Douglas. At the same meeting the appointment of Professor J. G. Lemmon as Botanist for the Board was confirmed.

The officers of the Board, especially the Botanist and Engineer, prosecuted their work with great diligence during the summer months of the year 1888, for it will be readily understood that it would have been impossible to go into the higher altitudes and the extreme northern counties to continue their researches during the winter, and from time to time sent in reports of the progress they were making. At the meeting of the twenty-fifth of July, on motion of Commissioner Moore, the Botanist, the Engineer, the Special Agent, and the Head Forester were notified that they were expected to present to the Board, at the meeting to be held October fifteenth, a brief outline of the reports which they were to prepare for publication and intended for presentation to his Excellency the Governor and the State Legislature. When the Board met on the date last named it was found that in order to provide for the publication of the reports, the making of the maps, the illustrating of the report of the Botanist, for the keeping up the work at the experimental stations, and the other necessary expenses of the Commission, it would be necessary to suspend, for a time, the work being performed by certain officers, thus cutting down the payroll to the lowest figure consistent with properly conducting the business of the Board. Accordingly the services of the Botanist, the Engineer, and the Special Agent were dispensed with after November first. Mr. William S. Lyon was appointed at this meeting to succeed Mr. Thos. H. Douglas as Head Forester. The officers who were suspended have but fairly entered on their most important labors, and it is hoped that the State Legislature will see the great necessity of providing such an appropriation as will be amply sufficient to enable the Board to continue their services, so that they may bring their work to a successful termination.

TREE PLANTING BULLETINS.

During the year now closing the Board of Forestry have issued the following tree planting bulletins:

FORESTRY BULLETIN, No. 1.

TREE PLANTING.

The encouragement of tree planting by tree seed distribution was the first temporary expedient adopted for that purpose by the California State Board of Forestry. We are to-day organized for what we hope will prove a practical and permanent plan for economic tree planting in California.

We have now two experimental forest stations established; one at Santa Monica, and the other the Bidwell Station, at Chico. In these two stations we have now more than one hundred and fifty thousand seedling forest trees, which will be ready for planting next season.

We have three other stations promised us, and expect to have experimental grounds planted as a park, for both beauty and instruction, in every climatic belt in California.

When any one desires to plant forest trees extensively, we will send the Head Forester to inspect the land and advise as to the kind to plant, the preparation of the soil, and the care of the trees after planting.

To prevent favoritism, and with a view to making the Forest Board eventually self-sustaining, we will charge for the time and expenses of the forest officers when thus engaged. We will also be able to furnish the rarer varieties of trees not grown in quantities by nurseries. Our object will be to encourage and make practical forest tree planting (now in a very unsatisfactory condition), and to help nurserymen, rather than to compete with them, by advice founded on the scientific observations our experimental stations will enable us to make. We also intend to try the experiment of planting out, for a fair remuneration, a few tree culture land claims, to see whether the Federal Land Act may not be made of some benefit to forestry, at least in California. As a part of this bulletin, we add suggestions in reference to planting forest seeds and forest trees, by T. H. Douglas, Head Forester.

The Board in its efforts to encourage tree planting by accurate information and the aid of a practical tree planter, will not lose sight of the fact that the one great object of Forestry in California is to preserve the brush and tree-covered mountain watersheds of the

State, and to manage the existing forests scientifically, so that these may supply fuel and lumber, and yet retain their reproductive power and general forest integrity.

ABBOT KINNEY,
JOHN D. SPRECKELS,
WALTER S. MOORE,
Commissioners of Forestry.

CARE OF SEEDLING TREES.

When forest tree seedlings packed closely as they usually must be, are received from a distance, they should be taken out of the boxes without loss of time. Unpack the boxes in the shade; prepare a puddle of rich soil mixed with water to about the consistency of paint; dip each bundle of trees so that all the roots will be coated with the puddle. If evergreen trees, the puddle must not be allowed to come in contact with the foliage.

If planting can be commenced within a day or two, the bundles of trees may be placed standing with the roots on moist ground in the shed or cellar and packing material placed around them. If not ready to plant in a day or two, the trees should be laid in a trench, standing, and in thin layers, with earth pressed firmly over the roots of each layer, in a cool, shady place, with a few branches of trees or straw over the tops. This is called by nurserymen, *heeling in*. Trees in boxes as transplanted from seed beds, of course, do not need this treatment.

Land to be planted with forest trees should be prepared as well as for a farm crop. The roots of the trees should be kept moist and not exposed to the air while being planted. Plant them a little deeper than they stood in the nursery, and press the earth firmly with the foot over the roots of each tree when planted. Keep the soil loose and free from weeds until the trees shade the ground and prevent the weeds growing.

T. H. DOUGLAS,
Head Forester.

ASH.

The white, blue, and all other kinds of ash seed, except the green, should be mixed with moist sand as soon as gathered, and placed in a cool place until time to sow in the spring. A slight frost will not hurt them if not allowed to "freeze dry."

The green ash seed can be kept dry, but it is a good plan to soak it in water a few days before sowing. Cover all from one quarter to one half inch.

AILANTHUS

Can be kept dry and sown late in the spring when the ground gets warmer. Cover about one fourth inch.

ACACIA AND PSEUDACACIA

Can be kept dry, but should be soaked in *warm* water before sowing, as the shell is very hard, and some of it will not come the first year if not well soaked.

NEGUNDO (BOX ELDER)

Is much better kept the same as white ash, but can be kept dry; in which case soak it thoroughly before sowing.

CATALPA.

Catalpa seed is kept dry and should not be sown until the ground gets thoroughly warm, as it is apt to rot in cold, wet soil; cover about half an inch.

ELM.

Elm seeds ripen in the spring, and should be gathered and sown at once; cover lightly.

EUCALYPTUS.

Eucalyptus seeds of all kinds should be kept dry. They are very easy to start, if not covered too deeply.

MAPLE.

Hard or sugar maple ripens its seeds in the fall, and should be mixed with moist earth. But a small per cent will grow if kept dry. At the best there is not over 50 per cent of it perfect seed. Cover not to exceed one half inch.

Soft maple (white) and red maple ripen their seeds in the spring, and should be sown at once. Do not leave them, nor elm seeds, in boxes or baskets long, as they are liable to heat and spoil; have known them to spoil from lying in a box two days. Cover the same as hard maple.

NUTS.

All nuts with a pulpy covering should be put in a rot heap, *i. e.*, a layer of nuts two or three inches deep, then a layer of earth the same thickness, then nuts, and so on. The whole wet down; freezing will not be injurious. In the case of acorns, chestnuts, etc., they should be fixed with sand and kept in a *cool place*.

PINES

Can be sown dry, and will need a protection such as lath frames or brush. They can be sown broadcast and raked in very lightly.

SPRUCE, FIRS, CYPRESS, ETC.,

Need the same treatment as pines. Junipers are very slow to germinate, sometimes requiring two or more years to generate. They should be put in a rot heap. All of the conifers are slow growers the first year.

FORESTRY BULLETIN, No. 2.

The nursery at the State Board of Forestry Station, at Santa Monica, is now ready to furnish rare trees for experiment, in small or in large quantities. The lowness of our appropriation, together with the desire of the Board to show no favoritism to any one, have induced us to charge the cost of rearing and boxing upon all trees. Besides this preliminary list, we have ready or nearly ready for distribution a large number of native trees. The experimental stations at Chico, Hesperia, and San Jacinto will soon offer information as to what trees do best in our different climatic belts, and will thus give a basis upon which persons interested may make large plantations of trees on waste lands for fuel, lumber, or the arts.

Persons desiring trees will please address Abbot Kinney, Chairman State Board of Forestry, Santa Monica, California.

	Per doz.	Per 100.
<i>Acacia melanoxydon</i>	25 cts.	\$4 00
<i>Acacia decurrens</i> (Australian wattle).....	25 cts.	4 00
<i>Acacia pycnantha</i> (broad leaf wattle).....	25 cts.	4 00
<i>Ailanthus glandulosus</i>	25 cts.	3 00
<i>Acer macrophyllum</i> (maple)	25 cts.	4 00
<i>Acer negundo</i>	25 cts.	3 00
<i>Catalpa speciosa</i> , 2 to 3 ft. tp.	25 cts.	4 00
<i>Catalpa speciosa</i> , 1 to 2 ft.		1 50
<i>Eucalyptus corynocalyx</i> (sugar gum)	25 cts.	4 00
<i>Eucalyptus eugenioides</i> (noble gum)	25 cts.	4 00
<i>Eucalyptus gomphocephala</i> (tooart gum).....	25 cts.	4 00
<i>Eucalyptus obliqua</i> (stringy bark).....	25 cts.	4 00
<i>Eucalyptus polyanthema</i> (poplar leaved gum).....	25 cts.	4 00
<i>Eucalyptus rostrata</i> (red gum)	25 cts.	3 00
<i>Eucalyptus viminalis</i> (manna gum)	25 cts.	4 00
All other eucalyptus, 50 cts. per dozen.		
<i>Robinia pseudacacia</i> (locust)	25 cts.	3 00
<i>Schinus molle</i> , 18 to 34 in. (pepper tree)	25 cts.	4 00

List No. 1. Price, \$5.

<i>Eucalyptus polyanthema</i>	20 plants.
<i>Eucalyptus viminalis</i> (manna gum)	20 plants.
<i>Eucalyptus leucocorydon</i> (blue gum of South Australia).....	10 plants.
<i>Eucalyptus doratocylon</i>	5 plants.
<i>Eucalyptus corymbosa</i>	5 plants.
<i>Eucalyptus colophylla</i> (red gum of West Australia) ..	5 plants.
<i>Eucalyptus obliqua</i> (stringy bark).....	10 plants.
<i>Eucalyptus eugenioides</i> (noble gum).....	5 plants.
<i>Eucalyptus marginata</i> (jarrah)	5 plants.
<i>Eucalyptus globulus</i> (Tasmanian or common blue gum).....	5 plants.
<i>Eucalyptus hemiphloia</i> (box)	3 plants.
<i>Eucalyptus paniculata</i>	3 plants.
<i>Eucalyptus luehmanni</i>	4 plants.
100 plants.	

In case we are out of any of the above, we reserve the right to replace them with other kinds equally rare and valuable.

List No. 2. Price, \$5.

<i>Eucalyptus gomphocephala</i> (tooart gum)	20 plants.
<i>Eucalyptus rostrata</i> (red gum)	20 plants.
<i>Eucalyptus corynocalyx</i> (sugar gum)	10 plants.
<i>Eucalyptus stuartiana</i>	5 plants.
<i>Eucalyptus robusta</i>	5 plants.
<i>Eucalyptus amygdalina</i> (giant or messmate gum)	5 plants.
<i>Eucalyptus pilularis</i> (black butt)	5 plants.
<i>Eucalyptus platypus</i>	5 plants.
<i>Eucalyptus rudis</i>	5 plants.
<i>Eucalyptus cornuta</i>	5 plants.
<i>Eucalyptus capilellata</i>	5 plants.
<i>Eucalyptus planchonsiana</i>	5 plants.
<i>Eucalyptus platypus</i> (variety <i>purpurens</i>)	5 plants.

100 plants.

We reserve the same rights as in No. 1.

List No. 3. Price, \$1.

<i>Eucalyptus polyanthema</i>	4 plants.
<i>Eucalyptus viminalis</i>	4 plants.
<i>Eucalyptus leucoxyton</i>	4 plants.

List No. 4. Price, \$1.

<i>Eucalyptus gomphocephala</i>	4 plants.
<i>Eucalyptus obliqua</i>	4 plants.
<i>Eucalyptus rostrata</i>	4 plants.

The following at \$1 per box—16 plants, of one variety:

Eucalyptus polyanthema.
Eucalyptus viminalis.
Eucalyptus leucoxyton.
Eucalyptus obliqua.
Eucalyptus gomphocephala.
Eucalyptus rostrata.

FORESTRY BULLETIN No. 3.

LIST OF TREES AND PRICES AT SANTA MONICA EXPERIMENTAL STATION.

	Per Doz.	Per 100.
<i>Acacia melanoxylon</i> , transplanted	50 cts.	\$4 00
<i>Acacia decurrens</i> , transplanted	50 cts.	4 00
<i>Acacia pycnantha</i> , transplanted	50 cts.	4 00
<i>Ailanthus glandulosus</i>	50 cts.	3 00
<i>Acer macrophyllum</i> , transplanted	50 cts.	4 00
<i>Acer negundo</i>	50 cts.	3 00
<i>Catalpa speciosa</i> , 3 to 4 feet, transplanted	50 cts.	4 00
<i>Catalpa speciosa</i> , 2 to 3 feet, transplanted	50 cts.	2 00
<i>Eucalyptus corynocalyx</i> (sugar gum), transplanted	50 cts.	4 00
<i>Eucalyptus eugenoides</i> , transplanted	50 cts.	4 00
<i>Eucalyptus gomphocephala</i> (tooart), transplanted	50 cts.	4 00
<i>Eucalyptus obliqua</i> , transplanted	50 cts.	4 00
<i>Eucalyptus polyanthema</i> , transplanted	50 cts.	4 00
<i>Eucalyptus rostrata</i> (common red gum), transplanted	50 cts.	3 00
<i>Eucalyptus viminalis</i> (manna gum), transplanted	50 cts.	4 00
<i>Eucalyptus leucoxyton</i> (blue gum of Australia), transplanted	50 cts.	4 00
<i>Eucalyptus globulus</i> (blue gum of Tasmania), transplanted	50 cts.	3 00
<i>Robinia pseudacacia</i> (locust), 18 to 30 inches	50 cts.	3 00
<i>Schinus molle</i> (pepper)	50 cts.	6 00

The following varieties of eucalyptus are now ready to be delivered at the Santa Monica express office, or railroad station, in boxes of one hundred (100) plants, at four dollars (\$4) per box:

Eucalyptus amygdalina (giant tree of Australia).
Eucalyptus leucoxyton (blue gum of Australia).
Eucalyptus corynocalyx (sugar gum, fine tree).
Eucalyptus globulus (blue gum of Tasmania).
Eucalyptus gomphocephala (tooart gum, fine tree).
Eucalyptus marginata.
Eucalyptus obliqua.
Eucalyptus eugenoides.



No. 1.—*Pinus monticola*, Dougl.—Mountain Pine, Webber Lake, near Truckee.
Alt. 8,000 feet.



Eucalyptus polyanthema.
 Eucalyptus viminalis (manna gum, fine tree).
 Eucalyptus rostrata (common red gum).
 Sixteen trees in a box for one dollar (\$1).
 Eucalyptus calyophylla (red gum of West Australia, large, handsome flowers).
 Eucalyptus paniculata.
 Eucalyptus stuartiana.
 Eucalyptus hemiophloia.
 Eucalyptus robusta.

Address—

ABBOT KINNEY,

Chairman State Board of Forestry, at Santa Monica, California.

TREE SEED DISTRIBUTION.

During the years 1887-88 there was sent out by the Board over \$600 worth of tree seeds, and on every package was printed a request to the effect that the party planting the seed would note its growth and progress, and report the same from time to time to the Commission. Not many answers up to the present writing have been received, probably owing in most cases to the comparatively short time that has elapsed since the seeds were planted, but those thus far received have been decidedly satisfactory.

The following may serve as a sample:

COLONY OLIVENHAIN, October 9, 1888.

To the State Board of Forestry:

GENTLEMEN: May I ask your favor in sending some seeds for myself and a few friends, mostly eucalyptus and gold wattle. Two years ago I wrote to the Hon. Abbot Kinney and got seed from the gentleman. For one year I carried the water which was necessary for the trees a quarter of a mile, but must say to a great extent I am rewarded. I have some two hundred gum and gold wattle growing, some of the blue gum having a height of ten to twelve feet; and so has a neighbor of mine, Mr. David Geiger. Some of the other neighbors, who neglected it two years ago, would like to try again, as I have proven by what success I have had that the trees can be grown.

By sending some eucalyptus corynocalyx, eucalyptus globulus, and red gum, you could indeed oblige us very much. I intend to plant a little forest of my own; besides, the trees are a good windbreak.

Most respectfully, yours truly,

JOHN ETZELSTORFER.

P. S.—Please send a little gold wattle seed too; and, if you have anything new, let me try it. J. E.

REPORTS OF SUB-AGENTS.

The corps of sub-agents, who are distributed through the thirty-five timber counties of the State, are unanimous in their opinion that the generous posting of the fire notices during the past two years has had a most salutary effect, and saved to the State untold thousands of dollars' worth of valuable timber. From San Diego County the sub-agent sends the following:

SAN DIEGO COUNTY.

SAN DIEGO, CALIFORNIA, November 5, 1888.

To the State Board of Forestry:

GENTLEMEN: I have posted fire notices in the different parts of the county that I have traveled through for the past eighteen months—along the following roads, and in most of the valleys near to them: Julian, Stonewall, Descanso, Alpine, Lawson Valley, Lyons Valley, Jamul, Dubzura, and Campo. I consider they have had a very good effect, as in districts where considerable timber had been cut on Government land, there is not any being destroyed in that manner at the present time.

They have also had the effect of making settlers more careful in setting fire to brush but great improvements in this direction might be made.

The only districts I know of where much timber is being cut are near the Julian and Stonewall Mines, and that is being used for mining purposes.

Oak timber grows at a distance of from twenty-five to thirty miles from the coast, at an elevation of about one thousand feet. The varieties consists of black oak, white oak, and live oak. Pine timber grows at a distance of about fifty to sixty miles from the coast, at an elevation of three thousand five hundred to four thousand feet, some of it being of very large growth. Timber grows in considerable quantities in most of the valleys and on the sides of some of the mountains.

The water supply in the mountains is adequate for all purposes. The Cuyamaca and Sweetwater Dams are doing much towards supplying the wants of land owners near the coast, and are thus utilizing a large quantity of water which has heretofore gone to waste.

FOREST FIRES.

At least one third of the land covered with brush, grass, and oak timber in the southern part of this county has been burnt off by settlers within the past eighteen months, doing a great deal of damage, not only as regards pasturage, timber, and bees, but also decreasing the reservoirs of water, which the absence of brush will effect, to a certain extent, the same as timber. These fires are caused by careless settlers, who at the time only intend to burn a few acres of brush, but everything being very dry at the time the fire soon gets out of their control, and the result is the fire takes everything before it. I have seen these fires spread five miles square in a few days. It is impossible to convict these parties without they are caught in the act. I would suggest that each year, from the month of July to the month of November, a special officer be paid to look up these cases, and, by making an example of one or two incendiaries, soon stop this great evil. Settlers find out after a little experience that after setting fire to the brush it is harder to grub, as they have not the limbs to pull by, and it is also very disagreeable to handle on account of the charcoal being on the short limbs, so that nothing is really gained by setting fire to the brush.

VINEYARDS.

More grapes are grown in El Cajon Valley than in all the other valleys in San Diego County. These grapes are grown without irrigation, and seem to do very well.

It is hard to obtain any accurate statistics of the number of acres planted in vines at the present time in San Diego County, but from what I can obtain from a published account, there are about 1,200 acres of wine grapes, 7,000 acres of raisin grapes, and 500 acres of table grapes.

The vineyards containing more than one hundred acres in El Cajon Valley are:

Johnson & Marshall, 800 acres; A. Hart, 200 acres; Souther & Crosby, 585 acres; A. K. Holt, 150 acres; Geo. A. Cowles estate, 400 acres; Levi Chase, 130 acres; H. P. McKoon, 300 acres; W. Peel, 120 acres.

There are a great many more vineyards in the valley of forty acres and less. Some very fine raisin grapes are also grown at Alpine.

A very large acreage of fruit trees of nearly every variety has been planted in different parts of the county.

TIMBER CULTURE CLAIMS.

Quite a number of timber culture claims have been filed on in this county within the past three years. Several were filed on for speculation, and a great many have been contested on account of there already being timber on the claim or in the section. Why are not some of these parties prosecuted for perjury? A few settlers are complying with the law to the best of their ability, but it will be impossible for many of them to have the required number of trees growing at the end of the eight years.

The law requires that at the time of final proof:

First—That not less than two thousand seven hundred trees, of the proper character, were planted on each acre required to be planted.

Second—That the quantity and character of trees as aforesaid have been cultivated and protected for not less than eight years preceding the time of making proof.

Third—That at the time of making proof there are growing at least six hundred and seventy-five living and thrifty trees to each acre.

Now two thousand seven hundred trees to the acre means planting them four feet apart, and of course we know that is too close for almost any trees to be planted, and what is the use of planting them for the sake of putting them in the ground, not only for 75 per cent to die, but to impoverish and stunt the growth of those that live. We would have more healthy trees at twenty feet apart. Even six hundred and seventy-five trees, the quantity required to the acre, living and thrifty at the time of proving up, is entirely too many to the acre.

If the law were revised so that a settler might plant the trees anywhere to do the most good, and so that he had a certain number of living, thrifty trees to every forty acres of his claim, give him his patent. In this way a settler might plant trees around his house, barn, or boundary line, in fact, anywhere to do the most good.

Respectfully,

FRED. E. LEWIS,

United States Deputy Mineral Surveyor, Special Agent State Board of Forestry.

PLUMAS COUNTY.

To the honorable State Board of Forestry:

GENTLEMEN: I somewhat regret the circumstances that make it necessary for me to furnish the Board a report *prematurely*. When I received your letter of the twenty-third of October, my commission, issued on the fifteenth of October, had been in my hands only five days. I cheerfully furnish you a report, though so meager have been my opportunities, and so limited the time, since my authorization to act in the interest of the Board, that the report must of necessity be very incomplete, and will be confined exclusively to Plumas County, through portions of which only I have moved.

THE VASTNESS AND THE GRANDEUR OF HER TIMBER WEALTH.

The computed area of the nine counties lying chiefly beyond the foothill limits, and making up one half, less or more, of the timber area of the State, viz.: Sierra, Plumas, Lassen, Modoc, Siskiyou, Del Norte, Trinity, Shasta, and Tehama, is fourteen million five hundred and seventy-four thousand acres. And, making allowances for the nude surface above the snow line and on the summits of the watersheds, and for desert parts and parts covered by lava and chaparral, as well as for agricultural and dairy lands, it is safe to estimate that at least two thirds of the above area, or nine million seven hundred and sixteen thousand acres, is well timbered woodland. Of the fourteen million five hundred and seventy-four thousand acres in the nine most northern counties, Plumas covers one million five hundred and eleven thousand and forty acres; and deducting for agricultural and grazing lands and barren mountain lands, and for portions partially denuded of timber by the sawyers, there remain in the county at least one million two hundred and fifty thousand acres of heavily timbered land. The dense and heavy tracts of timber are numerous; so that it is rather difficult to intelligently locate them. There are two prominently heavy belts of timber in opposite extremes of the county. The one, and perhaps the densest, is located in the west and northwest part of the county, and sweeps in solid phalanx of giant conifers from the Big Meadows up the broad watershed of Mount Lassen, and from Prattville away to the west and southwest toward the summit overlooking the Sacramento Valley, and thence again away to the south toward Butte Valley and Dutch Hill, down the North Fork of the Feather River and its tributaries, covering all of the vast drainage slopes over which Mount Lassen stands sentry. The other belt is in the east and southeast portion of the county, beginning about Spring Garden Ranch, ten miles east of Quincy, the county seat, and extending several leagues toward Beckwith, and up and down the East Branch of Feather River and its tributaries.

No more valuable and unbroken bodies of sugar pine, yellow pine, spruce, fir, cedar, abietine, etc., can be found in the State. And, though a lumber mill has been put in, here and there, at wide intervals, these magnificent forests are practically intact. There are ten saws in operation in the county, with a daily capacity of one hundred thousand feet, or an annual output of eighteen million feet of lumber, at an average run of six months in the year. Most of the mills are operated by water power, and are of small capacity, there being not more than half the amount of lumber cut since the decadence of the hydraulic mining that there was previously. The mills are adjacent to the farming and mining districts, and supply only the local demand, there being but one mill that ships out lumber, and that is on the highway between Quincy and Oroville, the latter place being the point of egress for their lumber. The two principal timber areas of the county are on the lines of two principal passes and waterways, over which two prospective railways will soon find access to this immense wealth of forestry now useless to the State, and, to a considerable extent, falling under wastage and other destroying influences. Above forty thousand acres of the finest timber land of the county is owned by the Sierra Flume and Lumber Company. May it to no greater extent fall into the rapacious hands of corporate power. It is not in the power of figures to estimate the value to the State of her forestry wealth, through the private citizen who shall possess it and transform it into the tangible prosperity of the commonwealth.

DESTRUCTION OF THE GOVERNMENT TIMBER.

Respecting forest fires, I have to report that they have, during the past summer, and up to the present time, been rather numerous in this quarter of the State, and some of them quite extensive in area, doing much damage. Around Big Meadows, Indian and American Valleys, and elsewhere in the county, fires have raged at intervals during the summer; and, though the damage is not very serious in any one locality, yet in the aggregate it is calamitous. Two summers ago, a forest fire occurred in the Cherokee Mining District, near Greenville, that consumed a \$5,000 quartz mill. Two of the most extensive and destructive fires in the timber adjacent to Indian Valley were the result of lightning, one of the causes of fire on the timber domain. Other causes are, presumably, the carelessness of hunters and stockmen and, inferentially, the work of some of the sheep men who desire better pasturage on the burnt districts the following season.

As to watershed and drainage slopes, they are unaltered and will so continue while the forest remains unbroken or not greatly changed.

Respecting depredations on the public lands, I have not the least doubt that there are not a few infractions of the law in this regard; but as yet I have no means of getting at the facts. The appointment of *forestry wardens* would do much to deter offenders.

SOME LEGISLATION

Is needed respecting greater vigilance and a more zealous care of our forestry domain. We would suggest that some action, State or National, be had looking to the appointment of forestry wardens over the timber domain of the State. I have not called them fire wardens, because their duties should be more comprehensive. When fires break out on the public lands they should have the authority to employ men to extinguish them at the public expense. It frequently happens on the occurrence of forest fires that the laboring classes are so occupied with their industrial pursuits that they have not the time to remain at the scene of the fire, after a partial extinguishment, long enough to completely subdue it. In such instances there should be some power to command the services of unoccupied men to put out the fire in its incipency, and to remain at the scene of the conflagration until it is completely controlled.

It should be the business of the wardens also to be on the alert for the causes of fires, and to endeavor to bring to punishment any who carelessly or otherwise set fires; and to post themselves in respect to the boundaries of the different timber claimants, so as to see that none trespass upon the public lands. This forestry wardenship might be added to the duties of the Boards of Supervisors of the respective counties, and a reasonable compensation be allowed to all who thus subserve the public good in the protection of the forestry interests, to be paid out of any fund available in the premises, the General Government indemnifying the State for any expense incurred in preserving United States property.

County Boards of Supervisors have been suggested in this connection, because the members of them are well distributed over the county, thus affording a fair opportunity of timely detecting fires or any depredations on the public domain; and because, also, they are supposed to be alive to every interest of their respective counties.

In conclusion, it seems to me that, from the exceeding meagerness of our information on the locality, extent, and nature of our valuable forestry interests and products, there is need of an active canvassing *forester*, as energetic and wide awake as the very gazelles of these primitive woods, to give accurate information of the locality and extent of the different grades of timber in the State, with the number and the names of all the varieties of trees growing in the State, and in what particular section to be found; to determine, approximately, the entire timber area of the State, the number of saws operated, and their annual output in lumber, with the consequent rate of denudation in a year, how, and what for; the rate of restoration in a year by tree planting; and to collect forestry products, materials, and information of value to the department.

I have visited the prominent schools of the county, and have endeavored to interest them in the execution of graphic representations of the forestry products of their respective regions, and there are quite a number of sketches in drawings and paintings forthcoming from the schools.

Yours very truly and respectfully,

G. D. HINES,
Special Agent California State Board of Forestry.

IRVINGTON, CALIFORNIA, October 31, 1888.

CALAVERAS COUNTY.

SAN ANDREAS, November 4, 1888.

To the State Board of Forestry:

GENTLEMEN: In answer to your circular letter, I will state that I have very little to report.

There have been no extensive fires in the timber belt this season. The number of notices posted did not exceed twelve. I am uncertain as to how much effect they had upon the setting of fires. Certain it is that there has not been so many as usual. There have been about four fires, which did considerable damage to limited localities in destroying mining ditch flumes, and in one case burned up about two thousand cords of wood, but they were soon mastered and extinguished. The most of our fires are chargeable to accident while men are out hunting, and carelessness in lighting pipes and dropping fire in the dry grass.

I know of no depredations upon the public lands and the timber belt, except what has been going on for years—I allude to the destruction of sugar pine. In traveling through the timber belt, large numbers of fine sugar pine trees are found cut down and lying on the ground to rot. Some of them have only one cut of three feet in length sawed out, and the balance left. In other cases, a fourth or a third of the tree is worked up for shakes and the rest left.

It seems that the system is to cut down a tree, and then saw out a cut; if this cut cannot be split and rived into shakes, the tree is considered worthless, and left to rot. It seems that these men cannot tell beforehand, to a certainty, whether the tree will rive or not. They can only tell by trial.

How this waste is to be remedied is a question.

The shake-makers are a class of poor men, generally trying to make a living, and to stop them from their work looks hard—since all over the country we see men of wealth who have been in the lumbering business and have undoubtedly trespassed heretofore to a greater or less extent upon the public lands. To discriminate against them would seem

to be like favoring the rich and oppressing the poor. Yet, it seems to me, that this thing should be stopped some way.

Yours respectfully,

A. H. COULTER,
Special Agent State Board of Forestry.

SAN BERNARDINO COUNTY.

SAN BERNARDINO, October 31, 1888.

To the State Board of Forestry:

GENTLEMEN: Your favor at hand. I would say to the State Board of Forestry that I have done all in my power to keep down fires, and I have succeeded in keeping sheep off of the most of the State and Government land in and about Bear Valley, one of the finest timbered and watered districts in the mountains, by placing friends of mine on timber claims in various places through the mountains, so that sheep could not get in without infringing on their claims, and by so doing have kept the mountains almost free of fires, as the sheep men are the cause of nine tenths of the fires in the mountains.

During the summer I have posted about fifty fire notices throughout my district, and as there has not been a fire this summer and fall that has done any damage, I judge by this that the fire notices have done the business. I watched very close this fall to try and catch some party setting out fires, to make an example of, but I could not do it, as there was none set out. Last fall a year ago the mountains were afire in every direction, which shows that the work has done some good.

Hoping that the above will be satisfactory,

Yours truly,

GUS. KNIGHT, JR.,
Special Agent State Board of Forestry.

TUOLUMNE COUNTY.

SONORA, TUOLUMNE COUNTY, November 5, 1888.

To the State Board of Forestry:

GENTLEMEN: I have made during the year two trips, as far east in Tuolumne County as Baker Station, which is situated on the north bank of Main Fork of the Tuolumne River, and about nine miles from the summit.

I traveled on the Sonora and Mono wagon road, which runs through the principal timber cutting region of the county. I find that the shake-makers, since the notices were posted, have abandoned the business of cutting timber on public land. Early in the spring I was notified that two men were about to begin cutting timber on unsurveyed land near Strawberry. I warned them that if they did they would be prosecuted, and they desisted. In fact, shakes for the last year have been scarce and dear. The sawmills, of which we have three in the county, cut timber on the lands owned by them. All the notices sent me by the office have been posted to the best advantage over the county.

This has been the driest season for many years. The rivers are very low, and many springs have dried that always flowed since the settlement of the county. For two years the rainfall has been very light. I have a theory that the denudation of the forests of the State is only a minor cause of the scarcity of water in the earth. At the time of the first settlement of the State, the earth was as porous as a sponge, and retained the water. I have seen the time in early days when a wagon could not be driven out of a beaten road, and when it was dangerous to ride a horse off a well traveled trail. The thousands of animals that have roamed over the country for the last thirty-nine years, the travel of men and wagons, and other causes of like nature, have hardened and settled the surface of the ground and the water runs off without penetrating. There can be no doubt that sheep are a curse to the State; they penetrate everywhere, destroy the roots and seeds of the grasses, in traveling over the hills they keep the rocks and earth moving, destroying vegetation and denuding the hills of their soil, and are the cause of more fires than anything else.

Respectfully,

J. P. DART,
Special Agent State Board of Forestry.

HUMBOLDT COUNTY.

GARBERVILLE, HUMBOLDT COUNTY, October 11, 1888.

To the State Board of Forestry:

GENTLEMEN: I have lately been over considerable of the ground, on which I posted fire notices, in the South Fork Township. That part lying west of the South Fork of Eel River is more heavily timbered than the balance, and quite a number of notices were posted through this portion. I find about one third of these have been torn down, and it might be advisable to post more before the first of June next.

From my acquaintance with the people and their habits, I believe these notices were generally destroyed by parties who have been the cause of the fires that have burned yearly for a long time; yet they were read by many, before they were torn down, and have done much good, for this summer there has been no smoke in the country, while other years there has been much smoke from fires burning in the woods, and from which more or less good timber fell.

From my own knowledge, and from inquiries made of parties living in different sections, I may say that there has been less fire this summer than for many years, and it has been unusually favorable for fires, having been hot and dry. It is now so late in the season that there is but little danger before another spring.

There was a fire in the northern part of Mendocino County that burned through some whitethorn thickets, and some large timber fell. This fire was on Government land, and I have been told that it was set out purposely.

During the last few years thousands of tanbark oak trees have been cut along the coast, in the southern part of this county and northern part of Mendocino County. The bark of every available tree over six or eight inches in diameter has been used. The bodies of these trees are now lying in every direction among the standing timber, which is composed of white, black, and live oak, fir, madrona, redwood, etc. It is almost certain that in the near future fire will run through these fallen trees, and greater damage than usual will be done to the standing timber. I think there is some tanbark timber occasionally cut on Government land by parties owning bark land adjoining, they claiming not to know where their lines are. The only way to know this positively would be to run lines by a surveyor; or, if the violations of law were flagrant, any good woodman could tell by going over the ground. I have heard parties that work in the woods say they thought tanbark was sometimes cut on Government land, and these men usually are correct in their opinion.

Very respectfully,

C. B. FROST,
Special Agent State Board of Forestry.

The reports of the Special Agents given above, are the more important ones received at the main office, though others were sent in which contained matter not sufficiently valuable to warrant publication. In every instance, however, the opinion was expressed that the posting of the fire notices and the publicity given to the reward for illegal cutting of timber on State and Government land had been productive of a great saving to the people.

THE MECHANICS FAIR EXHIBIT.

At the meeting of the Board held July 25, 1888, on motion of Hon. John D. Spreckels, it was decided to make an exhibit of cones, barks, and specimens of California woods at the Mechanics Fair, to be held in San Francisco during the months of August and September. It was thought that such an exhibition could do much to attract increased attention to the subject of forestry, and Professor Lemmon and his wife were appointed to take charge of the display. It is believed that the exhibit had a most satisfactory effect, as great interest was evinced in it by the many thousands who visited the Fair.

In conclusion I beg leave to present a statement of the expenditures of the Board of Forestry from March 31, 1887, to November 1, 1888:

FINANCIAL STATEMENT.

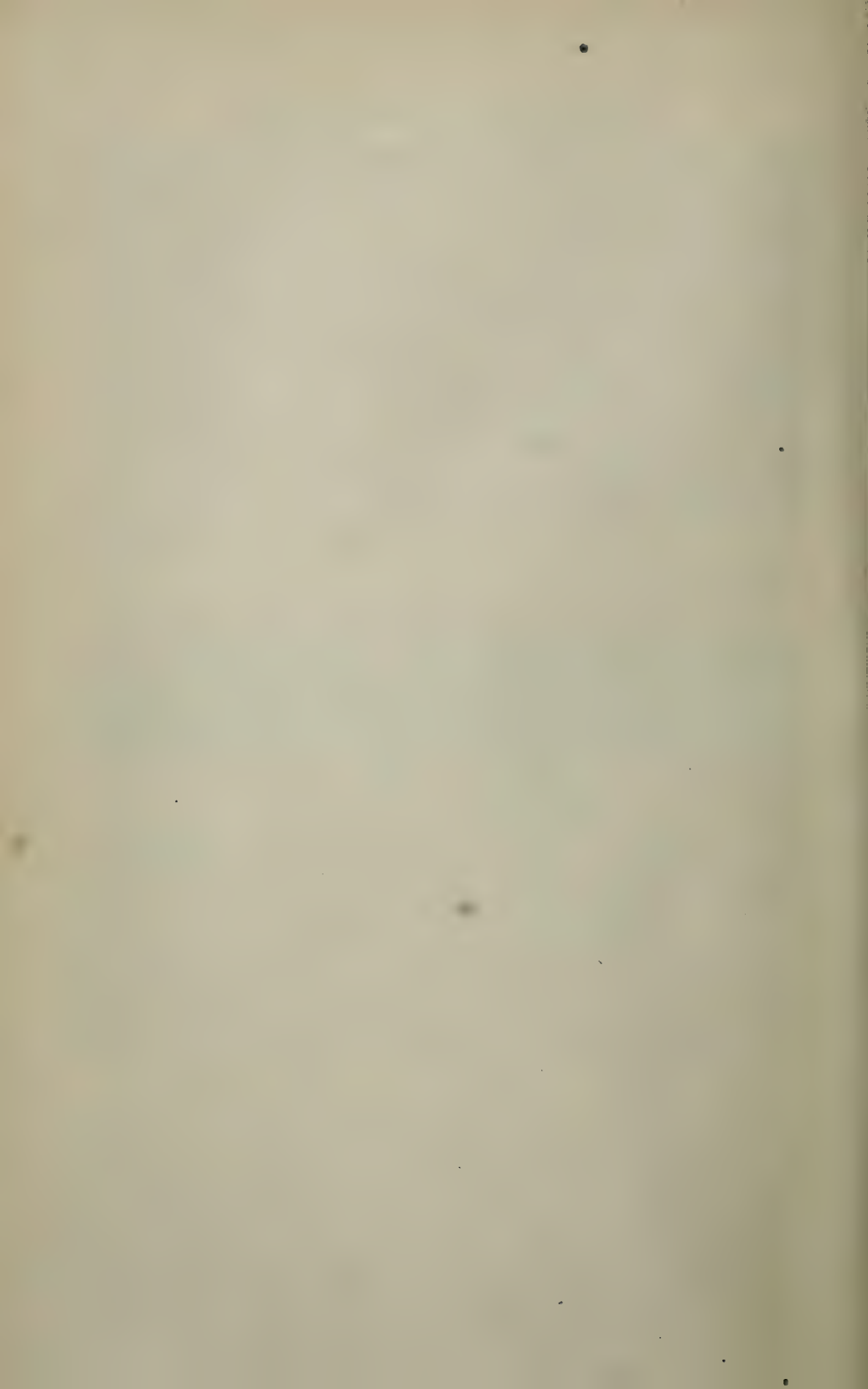
Appropriation, 1887-1888		\$29,500 00
Salary of Botanist	\$1,200 00	
Incidental expenses of Botanist	154 00	
Salary of Engineer	2,250 00	
Traveling expenses of Engineer	964 40	
Salary of Secretary	2,375 00	
Incidental expenses of Secretary	157 70	
Salary of Head Forester	1,332 50	
Traveling expenses, etc., of Head Forester	365 30	
Salary of Special Agent	1,145 00	
Traveling expenses of Special Agent	966 30	
Salary of detective	320 00	
Incidental and traveling expenses of detective	160 10	
Salary of clerk at Santa Monica	400 00	
Traveling and incidental expenses of Commissioners	1,327 37	
Salary of Forestry agents, posting notices, etc.	571 50	
Expenses of Experimental Stations	7,426 52	
Seeds, trees, etc., distributed	627 07	
Stationery, porter, postage, printing, etc., main office	473 57	
Office rent, furniture, fuel, etc., main office	600 57	
Legal expenses	75 00	
Expenses of Forestry exhibit in Mechanics Fair, San Francisco....	177 35	
		<hr/>
		23,069 25
Balance to credit of Board		<hr/>
		\$6,430 75

It should be borne in mind that five months are yet to intervene between the date of the above statement and the expiration of the time in which the last appropriation has to run. The balance to the credit of the Board, it is thought, will barely suffice to pay the necessary expenses of the Board, the care and cultivation of the plantations already set out and growing, the expense of illustrating by plates and maps the present report, the sending of the same through the mails, the traveling expenses of the Commissioners and officers, and the necessary incidental expenses of the main office.

Respectfully,

SANDS W. FORMAN,
Secretary.

November 1, 1888.





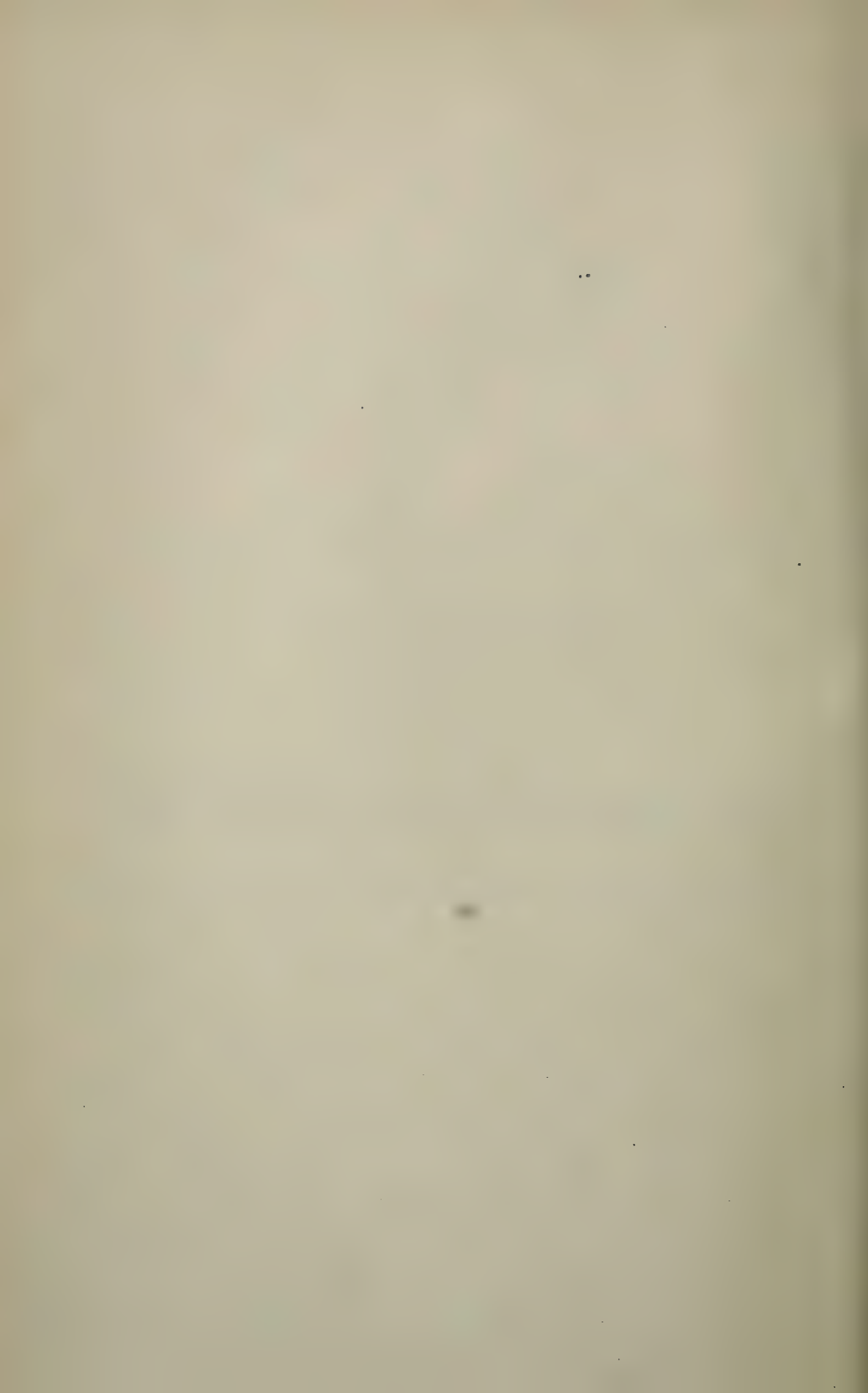
No. 2.—*Pinus Lambertiana*, Dougl.—Sugar Pine, near Mt. Shasta. Alt. 5,000 feet.



SUGGESTIONS

FOR

Forest Planting in California, by Wm. S. Lyon, Head Forester.



SUGGESTIONS FOR FOREST PLANTING IN CALIFORNIA.

PART I.

In an empire so vast as California, embracing every conceivable variety of known soil, from alluvial sedimentary deposits of inexhaustible depth and fertility to sterile and almost denuded mountain sides, containing at most shallow pockets of partly disintegrated shale and porphyry, and exhibiting within its boundaries a surprising range of meteorological conditions, comprising nearly all variations, from the continuous dew point to almost perfect atmospheric hydration, and with a rainfall varying from fifty inches to practically nothing, it can hardly be expected that explicit rules and directions governing the planting and future care of young forests can be indicated, which will exactly apply to all points and localities within an area exhibiting such diverse conditions. Hence, only such general suggestions to those intending to plant forests are here outlined, as well as the treatment of an exhaustive subject will admit of embodying within the limits of a brief memoir.

We may assume that for many years to come, forest planting will largely be confined to "waste" lands—not necessarily valueless tracts, but to such as are not considered arable; such as low mountains, steep foothills, cañons, or even the great sandy or boulder-filled washes which are salient features throughout the length of the State. This assumption is not based on any hypothesis that it will not pay to devote the cream of our farming lands to this purpose. No such concession is implied, as considerable acreage of our choicest lands has been long enough planted in locust, eucalyptus, or even the despised willow, to yield better returns than the same land will produce in cereals. The drawback to owners of small holdings from utilizing their best lands for this purpose must ever be the time elapsing before they can realize a crop—three to four years for willows, four to six years for gums, and six to eight for locusts. For the privilege of cutting such forest fifty dollars per acre in the first case, two hundred in the second, and two hundred and fifty for fencing posts in the last has been paid in different parts of the State where fuel or timber is scarce.

As the first crop is the only one requiring specific outlay of time and money, subsequent crops are only chargeable with taxes on the land and interest on the investment.

Some hundreds of acres of the best quality of "corn land" near Compton, Los Angeles County, are thus maintained in willows that pay on this basis 15 per cent per annum on a valuation of \$100 per acre. In the case of blue gums 50 per cent per annum income has been returned on this valuation.

As an industry, the planting of quick-growing forest has not been widely enough undertaken in this State to definitely fix the profits arising therefrom. The abundance or scarcity of native forest or brush land, the distance from a market, the price of coal or petroleum, are all factors which must regulate the profits and the practicability in each instance.

Indirectly, it in all cases pays. In our great interior valleys, forests not only furnish a supply of domestic fuel and timber, but are of inestimable

value for the shelter they afford growing crops against burning, drying winds.

On foothill and mountain lands their value as conservators of our water supply is too well known to require demonstration. Quick-growing forest trees are of doubtful value except planted and cared for as a crop.

In moist soil and with a little culture the blue gum will in five to six years produce a timber of sixty to seventy feet, and one and one half to two feet diameter at the ground.

The same tree, mountain planted, without care or cultivation, will, at the end of that period, be still a mere sapling. Hence, for "waste land" planting, I would commend trees of slower growth, slower returns, but ultimately of highest value as timber producers. Various species and system of planting are suggested later.

Foremost among rapid-growing trees for our arable or irrigable valley lands is, of course, the blue gum. Sensitive to light frosts when young, it will, when aged, withstand a temperature of 16 degrees Fahrenheit. The planting in any part of the State where 24 degrees is touched every winter is, however, attended with risk, as that temperature is quite sufficient to destroy a young plantation.

Eucalyptus rostrata and *eucalyptus paniculata* are much more enduring of cold, young trees of both having at Lancaster, California, withstood a temperature of 12 degrees Fahrenheit during winter of 1887-88.

Both will doubtless thrive in all our interior valleys south of Sacramento, where the blue gum has proven to be non-resistant of their normal winter weather; of slower growth, but with the claim made for both of producing more valuable timber than the blue gum.

During the coming winter the cold resistant power of many species of gums heretofore untried in California will be thoroughly tested.

In planting gums or any quick growing timber, the ground should be thoroughly prepared and the trees set out in rows six feet apart and the trees six feet distant in the rows.

The object of systematic planting is twofold. First, where this character of the land will admit, to enable the planter for one season to give careful, painstaking cultivation. Thereafter subsequent tillage will be needless. The normal growth of the young plantation should so shade the ground that weeds will not molest them. Secondly, close planting will induce a tall, straight growth, resulting in a spar, or timber free from knots or lateral growth.

After taking the first cutting, gums will sprout or "break" from near the ground, showing a bushy habit, but the original close planting again comes in play and a leader soon outstrips the other, and in a year or two the smaller growths will be shaded and die off, subsequently leaving a second cutting in character similar to the first.

Gums make their most vigorous growth during hot weather, hence winter or spring planting should be deferred until the ground is warm. Land kept mellow by winter cultivation will retain sufficient moisture to insure a good growth, although where summer irrigation be practical, phenomenal results may be attained.

Of trees of proximately rapid growth, requiring sufficiently good soil and enough moisture to be classed among those suitable for valley planting, we cite the locusts and catalpa as flourishing through the length and breadth of the State, standing all our extremes of climate, and of superior value for railroad ties and fencing. Both are freely grown from seed, the former only requiring a thorough soaking to facilitate sprouting. One

year of generous tilth in nursery produces a tree available for immediate forest planting.

A moderately rapid tree is the native California walnut; it is adapted to nearly all soils and situations (not alkaline) and has a range from Sacramento south and east through the State into Arizona, New Mexico, and Sonora. In rough mountains a mere shrub, it makes in good soil a tree of forty to fifty feet, and, though lacking the commercial value of the eastern black walnut, its worth as a tree of general adaptability must bring it to the front.

It should be transplanted at one year. The expense attendant transplanting of larger trees without injury to the taproot is inadequate to the benefits desired, except in small plantations. Only two native and one exotic conifers are recommended for planting on moist, arable lands.

The common Monterey pine is one, and that commendation solely with a view to its rapid production of forest, as the tree is only of medium size (sixty to eighty feet), and the lumber is of inferior quality. Still, it is unique among conifers, making in five years the growth that most species require fifteen to accomplish. It is easily grown from seed by an amateur, and should be handled and transplanted at our coldest season, as at that time it makes the bulk of its annual growth. Thriving naturally in a limited area, it has transplanted kindly to the southern end of the State, and its speedy growth has given it prominence to the exclusion of more valuable timber trees.

The exotic referred to (*casuarina equisetacæfolia*) has given good results wherever planted in the southern counties, but thrives best on moist lands.

The third and last conifer (unfortunately of slower growth) is the only one of the three of sufficient timber value to justify the surrender of irrigable lands of the best quality to its perpetual endowment. This is the "white cedar" of Oregon (*chamæcyparis lawsoniana*, or Lawson cypress).

It ranges from Shasta County north, but only in moist lands. Its perfect adaptability to all climatic conditions in all parts of our State has been conclusively proven, but abundance of irrigation for its full development is an absolute *sine qua non* to success. Its confessed and peerless beauty among our native conifers is, of course, a secondary consideration, but as a timber tree it stands preeminent, unapproached by the many fine timber trees peculiar to the west coast.

The wood is white, fragrant, and elastic, close and fine grained, and extremely durable, and, as it reaches a height of one hundred and twenty to one hundred and fifty feet, it furnishes the finest of material for spars and masts.

In Northern California it should be widely planted; in the southern and central part only, as previously stated, where facilities for continuous irrigation prevail.

Requiring two and three years' growth in nursery to make an available tree for planting out, enhances its first cost, and is consequently a drawback to extended planting.

On uplands, mesas, or even rolling foothills, particularly on such as are porous, gravelly, or even somewhat stony, without water facilities, and hence of minimum value for general agriculture, we would reject the quick-growing forest as ill adapted to produce full development of the tree, and consequently yield inadequate returns; for planting on such we suggest even as slow growers as the oaks.

Vast tracts of land of this character extend for many miles through our interior valleys entirely destitute of any vestige of trees, and although the wood of all our native oaks, with the possible exception of *quercus garryana*,

are, from their brash, brittle nature, of most doubtful value for timber, yet for fuel purposes they are unexceptionable—in fact, among the best.

Amongst many species the deciduous *Q. lobata* and the “live oak,” *Q. chrysolepis*, will best fulfill all requirements and all conditions on all lands as above described.

The live oak attains its finest development in the north central part of the State, the deciduous, in the southern portion; yet both species have the widest possible range from Tehama to San Diego County.

Being of wide-spreading habit—sixty to eighty feet diameter of head—no close planting is admissible or desirable. Fifteen feet apart each way, with a view to cutting out one half in a few years for fuel, and the subsequent removal of still another half, would leave room for the ultimate full development of the forest.

Q. garryana has the widest range of all the oaks, extending from British Columbia quite into our southeastern desert; but it naturally seeks better soils than the other species, and though its wide distribution enhances its worth, it is questionable if any slow growing tree not of assured timber value, can be profitably grown on high priced lands.

We can add that all these oaks are scattered throughout the mountains of California to considerable altitudes, but generally they become scrubby and depauperate.

Of trees that we know will thrive under analogous conditions with the oaks, but of smaller growth, are the California horse chestnut, in the north and central parts, and one species of manzanita (*arctostaphylos pungens*) in the south.

Both are only of fuel value, but self-supporting after the first year of planting. The former is easily grown from seed; the latter is of difficult and tedious germination.

For planting the numerous “washes” which indent our mountain ranges for their entire length, and which not infrequently develop into considerable expanse of waste land, nothing is more suitable than the maple and the sycamore. In any of these washes which, higher in the mountains, carry a water supply, the seepage in the dry parts will furnish enough water to assure success. Where the wash was only the outlet of a winter watershed, some water might be of advantage the first season.

Our California sycamore, though better than its eastern congener, is only noted as a variety—an alternative. It is of secondary value for both fuel and lumber. The California maple, however, is a timber tree of the very highest economic value. It is readily recognized by its very large leaf, light gray bark, and having its young branches green, with stripes of lighter or reddish color. The wood is white, very hard, and takes a high polish. For cabinet, or fine interior work, it is superior to the eastern white maple. It makes a tree of fifty to ninety feet, and stem of two to three feet in diameter, and stretches from San Diego County to the extreme northern boundary of the State.

Although, as stated, it grows in absolutely dry washes, its size steadily increases as we move north, which shows it is not unresponsive to increased rainfall.

Maples multiply freely and easily from seed, and one season in nursery fits it for permanent planting. In such of these washes which have water—even if it be largely withdrawn for irrigation—farther up them enough moisture and subterranean flow exists to nourish a great number of species.

In these places the California laurel and Oregon ash will indisputably thrive. Both are of easy propagation, fairly good growth, and of supreme commercial value in the arts. Both attain their highest development about

Douglas County, Oregon, and diminish a little in size at the extreme southern line of California. Still, the Oregon ash at the south develops to a tree, whilst the more southern ash (*fraxinus dipetela*) rarely exceeds a shrub of fifteen to twenty feet.

For planting on the arid and almost rainless desert lands in the south-east quarter of the State, we must have recourse chiefly to the mesquite. Even with irrigation, it is problematical if our best timber trees can there withstand the dryness of the atmosphere.

An exception may exist in some of the exotic acacias, as one native species (*A. greggi*) makes a tree of fifteen to twenty feet in some of the most forbidding parts of the territory. For fuel purposes the mesquite is rated higher than the oak, and has with few exceptions a more extended habitat than any known tree. It runs through Southern California eastward to Texas, and south through Mexico; thence into South America along the Andes into Chili; thence eastward once more across the continent into Buenos Ayres.

With such a range it might be safely attempted in Central California. The seed pods of this species are fed largely to horses, and quite an industry exists in Texas and Mexico in gathering its gum for export and adulteration with the gum arabic of commerce.

The pod of a smaller species (*prosopis pubescens*) is also ground into meal and used for food by both whites and Indians.

That the mesquite will respond to generous treatment is proven by seeing them in cultivation not infrequently as trees of thirty to forty feet, and on the desert sometimes a straggling shrub of five to ten feet.

Mesquite seed is most readily sprouted, and plantations should be made close, for though of spreading habit like the oaks, the branches are often spinescent, and like any other objectionable growth, can be crowded out and eliminated by close planting.

Along our southern seaboard we have for many miles long reaches of barren sea wastes; in some localities, as immediately south of Santa Monica, Los Angeles County, a substratum of good soil is overlaid with sand heaped up by the winds into fantastic dunes.

This character (with occasional rifts) extends throughout the coast line of Ventura, Los Angeles, and San Diego Counties. North of Point Conception the bolder conformity of the coast and approximation of the mountains to the sea, causes this phenomenon to disappear. Wherever it occurs the planting of *rhus integrifolia* and Torrey's pine can be resorted to with absolute certainty of success and without further care than the original planting.

The pine will make a tree of twenty to thirty feet, and, though becoming more or less deformed by the trade winds, serves to make an effective wind break and to utilize lands wholly worthless for general agriculture. It matters not how deep the overlying sand, it will grow in every instance.

Too much praise cannot be accorded the rhus; it makes a dense, dwarf, evergreen hedge of the neatest and most compact habit, of uniform growth, and thrives down almost to the high-water line.

As an underground mine its greatest riches occur. Small bushes—two to three feet—commonly bear roots three to five feet long and six to eight inches thick, which carry but few fibers, and hence are easily dug out and removed from the yielding sands.

The wood is a dark cherry-red and useful in cabinet work, as well as forming an excellent fuel. Other species of *rhus* approach the coast, but none combine both usefulness and beauty in so marked a degree.

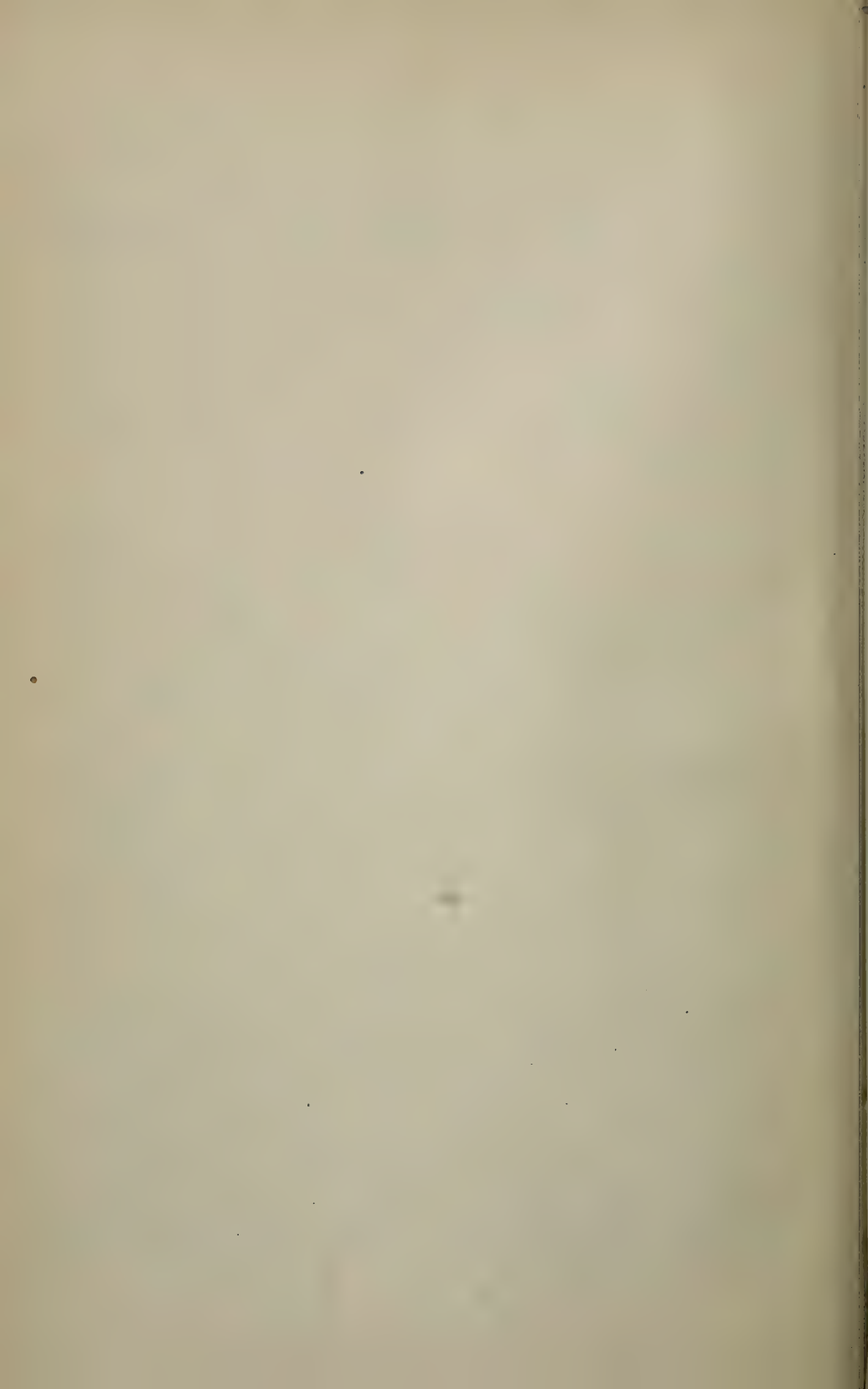
On the northern coast, sandy spits and bars are not only frequently invaded by conifers, but usually the adjacent country is sufficiently well supplied with fuel to make their specific planting unprofitable.

The distribution and treatment of coniferous trees for mountain planting will form the subject-matter of a subsequent memoir.

WM. S. LYON,
Head Forester.



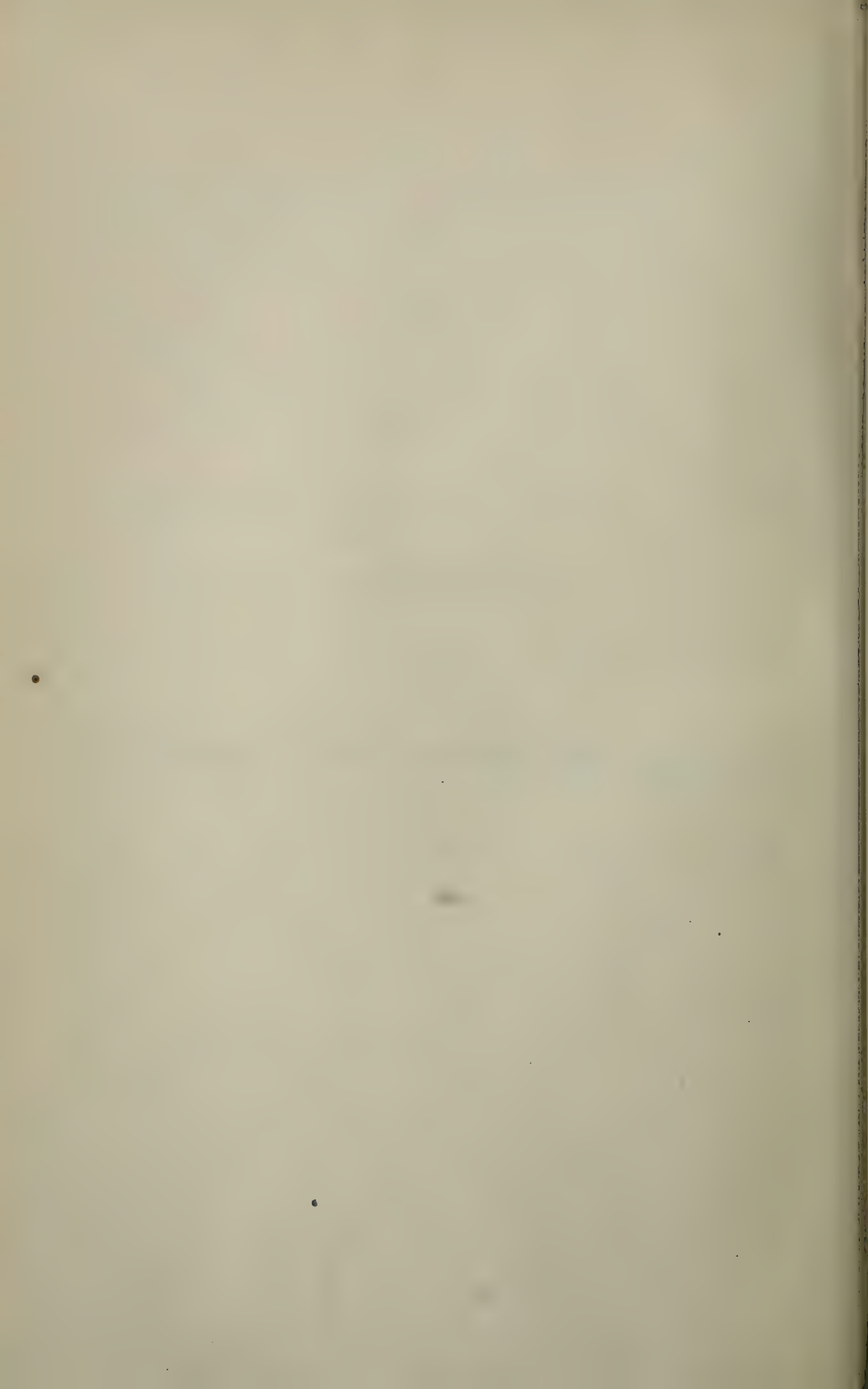
No. 4.—*Pinus albicaulis*, Engelm.—White-Bark Pine. On the timber line of Mt. Shasta. Alt. 9,000 feet.



REPORT

OF THE

Former Head Forester, Thos. H. Douglas.



REPORT OF HEAD FORESTER.

It is idle to talk of our natural forests furnishing a supply of wood for the future use of our people. Even with the most careful management and economy in regard to waste, there must soon come a great scarcity of all kinds of wood. Even now over one half of the accessible timber of the State has been cut. Flumes and railways have been constructed into the heart of the heaviest forests in the State. Especially is this the case with the redwood (*sequoia sempervirens*), sugar pine (*pinus lambertiana*), Oregon pine (*pseudotsuga douglasii*), and yellow pine (*pinus ponderosa*) forests. No matter in what way we turn, the fact stares us in the face that the best and most valuable forests on the coast—in other words, the finest timber in the world—are fast disappearing, and the sooner we begin to spare the young timber, and economize in the use of woods of all kinds, and preserve the forests now standing, as well as commence planting new ones, the better it will be for the present and future generations. The people of this State must awake to the matter sooner or later. There are now more acres of timber destroyed by fires, set by careless persons, than are planted. California has been classed as a timber State, but such is not the fact, as two thirds of what has not been already cut is inaccessible.

The States east of the Rocky Mountains have awakened to the necessity of keeping what forests they have, and are planting thousands of acres annually. Nebraska alone plants in the neighborhood of one hundred and fifty thousand acres annually; Kansas, Iowa, and Dakota nearly if not quite as many each; while in this State thousands of acres of land are lying idle that could be growing timber. Where brush will grow trees will grow, and it is one of the objects of the experimental stations of this Board to find out what kinds do best in certain localities. This is a greater undertaking than one at first might imagine, as the climate and soil vary so greatly in this State; marked differences being noticeable in places even within a few miles of each other. For instance, the eucalyptus globulus and acacias do well on the coast in San Diego County; three miles inland they make very little growth, and run out entirely five miles from the coast. The catalpa speciosa and robinia pseudacacia (the yellow locust of the East) here take their place and do remarkably well; but it would not be advisable to plant the latter where the citrus fruit will thrive, as they, like the true acacias, breed the cottony cushion scale. Both the catalpa and locust will stand very cold weather; they are both natives of southern Ohio, Indiana, and Illinois, and are perfectly hardy several hundred miles north. The Southern Pacific Railroad planted a great many catalpas along their lines in this State, but unfortunately they planted the catalpa bignonioides, a variety much inferior to the speciosa.

We have over thirty kinds of eucalyptus at the Santa Monica experimental nursery ready for this season's planting, and are in hopes some of them will grow on the sandy barrens of the southern part of the State without irrigation. I have no doubt but that the mesquite (*prosopis juliflora*), ironwood (*olneya tesota*), paloverde (*parkinsonia torreyana*), and desert willow (*chilopsis saligna*), all natives of New Mexico and Arizona will do well on any of the barren, sandy soils of Los Angeles, San Bernar-

dino, and San Diego Counties. I have known them to stand uninjured 24 degrees of frost (8 degrees Fahrenheit) in Arizona. The mesquite is very good for bees also, as it is in flower nearly all the year, but the heaviest bloom is in May and June. The desert willow is also in bloom nearly the whole year, but as there were no bees where I saw it growing I do not know how it answers for that purpose.

In forest planting the first thing to do, of course, is to get the ground in shape. It will not merely do to cut the brush off and plant the trees, but break it and have it in as good condition as you would for barley or other farm crop; if possible raise a crop on it before setting out the trees, in order to have it perfectly clean. Mark out as you would for corn. Do not mix your trees if possible, as the strongest growers when young will smother and kill out the slower growers, which may be the most valuable kind when grown properly. If planting in groups, select kinds that are known to do well together. Do not plant trees that have soft, spongy roots on very hard, heavy soil, especially when they have to send their roots through hardpan or stiff clay for water. The softness of the root denotes their habitat, which is either a light loam or sandy soil. Keep the ground well cultivated until the trees shade the soil so weeds will not grow. The eucalyptus family are about the only Australian forest trees that are not troubled with the scale, but as there are so many varieties of it planters must be careful to get a large growing kind, as some of them are merely shrubs. The following are all valuable forest trees:

Eucalyptus haemeostema—white gum. Good fuel. Height, fifty to one hundred feet. *Eucalyptus tereticornis*—gray or red gum. Inferior fuel. Durable in the ground. One hundred and fifty feet.

Eucalyptus siderophroia—dark or broad-leaved ironbark. The most valuable wood for piles, girders, etc. Superior fuel for steam engines. One hundred and fifty feet.

Eucalyptus paniculata—common ironbark. For most purposes equal to the last. More easily split. One hundred and fifty feet.

E. obliqua—stringbark. The best for flooring and sawn stuff. Inferior fuel. One hundred and twenty feet.

E. pilularis—blackbutt. Wood similar to above. One hundred and fifty to two hundred feet.

E. hemiophloia—common box. Hard, strong, tough, and durable above ground, but not lasting in contact with the earth. One hundred and fifty feet.

E. amygdalina—messmate or almond-leaved stringbark. A first class timber for flooring, etc. Inferior fuel. One hundred and fifty to two hundred feet.

E. bicolor—black box, ironbark box. A highly valued timber tree. Wood easily worked. One hundred to one hundred and fifty feet.

E. corymbosa—bloodwood. Durable as posts, piles, etc. Not a good fuel. One hundred and fifty to two hundred feet.

E. calophylla. Valuable for its timber and for ornament.

E. marginata—jarrah. A very excellent timber, and suitable for dry barren soils and severe climates.

E. globulus—Tasmanian blue gum. This tree is too well known to describe its useful qualities.

The above are all good timber trees and ought to be more generally distributed through the State, the southern part especially. The *E. polyanthema* is reported to do well also on dry gravelly soil, and furnishes durable timber; it bears transplanting better than most of the eucalyptus, and has certainly thrived well at the Santa Monica Station in soil too poor for other kinds. The great drawback to planting the eucalyptus is, most of them require considerable water and are very tender, a very few degrees of frost killing them to the ground; very few survived last winter's cold snap in the Sacramento Valley. I would not advise planting them where the redwood or "big tree," *sequoia sempervirens* and *S. gigantea*, will grow. The latter certainly do well in the San Gabriel Valley in the south, and Sacramento in the north.

It is a great pity that these and other valuable California trees, such as *pinus ponderosa*, *P. sabiniana*, *chaemicyparis lawsoniani*, *pseudotsuga douglasii*, *libocedrus decurrens*, *acer macrophyllum*, the larger growing oaks and other deciduous trees, have not been more generally planted, as they are very rapid growers and the timber when grown is of more use than the Australian trees. The *ailanthus glandulosus* is a rapid growing tree, furnishing excellent timber, but on account of the odor of the male flowers should not be planted near dwellings. The *pinus torreyana*, that rare and sturdy pine found growing in San Diego County, only near the coast, will, no doubt, do well many degrees farther north along the coast. It is not large enough for a forest tree, but will, no doubt, be found serviceable near the coast as a windbreak and to keep the sands from drifting. The Monterey pine (*P. insignis*) and Monterey cypress (*C. macrocarpa*) are also good for this purpose and adapt themselves to a great variety of soils. The Oregon ash (*fraxinus oregona*) and the Arizona ash (*F. pestæcifolia*) will, no doubt, do well in this State. I have seen the Arizona ash one year old that was from five to seven feet high. The Kentucky coffee tree (*gynonocladus canadensis*) is reported to do well wherever planted in this State, but from experience with it on the other side of the mountains I consider it a very slow grower.

What the State needs is rapid-growing trees, and they to be planted in forest form. A group or collection of trees will often grow and do well where a single tree of the same variety would die. In the former case they shade the ground more effectually, and each one helps to break the wind from the others. A great many people are under the erroneous idea that extensive planting of trees causes more rainfall, but such is not the case, as records and observations show. People point to the "plains" of Kansas and Nebraska, and say that before planting the thousands of acres of forest which has been done there, the ground was so dry that nothing would grow. Records show that there has not been a material change in the rainfall there during the past forty years; but, thanks to the plowed lands, which absorb all the rain that falls upon them (it all ran off before the plowing), and the forests already planted, which absorb all that falls among them, and by shading the ground retard evaporation, besides breaking the force of the winds, thereby rendering the air more humid, making it possible for plants and trees to grow there now, that the hot, drying winds of a quarter of a century ago would have dried up in a few hours.

THOS. H. DOUGLAS,
Former Head Forester.

REPORT

OF THE

SPECIAL AGENT, E. L. COLLINS.



No. 5.—*Pinus Balfouriana*, Jeff.—Fox-tail Pine, south flank of Mount Eddy, near Shasta. Alt. 7,000 feet.



REPORT OF THE SPECIAL AGENT.

SAN FRANCISCO, October 31, 1888.

To the State Board of Forestry:

GENTLEMEN: On the twenty-third day of July, 1887, I received from this Board an appointment as Special Agent. My instructions were to investigate all cases of alleged timber cutting and forest fires, and whenever good and reliable evidence could be secured against depredators, to prosecute them in Court. With this end in view, I have endeavored with the limited means at my command, to lessen the amount of forest destruction, taking such measures as seemed necessary to call the attention of the public to the statutes on this subject, and filing complaints against offenders of the law whenever circumstances seemed to justify it.

Up to the time that I received my commission, but little, if any, attempt had been made to enforce such laws as were designed to prevent depredations on timber lands. The prevalence of forest fires and indiscriminate destruction of timber on Government and State lands were rapidly diminishing in area and value our magnificent forest resources. Reckless and extravagant waste characterized the work of our lumber mills; open and unrestrained theft of wood and tanbark was carried on throughout the entire State. The forests were regarded as common property, open to depredation without question, against which no law had as yet been directed. To correct such a general and false impression was indeed no easy task; to successfully prosecute a case of timber depredation before a jury of men holding such views was still more difficult.

Such was the character of the work upon which my labors were thenceforth directed, to combat the customs and usages of long years, and inaugurate and carry out a line of policy different from what had heretofore existed.

At this time it was known to the Board that several large lumber companies had for many years been unlawfully removing timber from State school lands. As the Forestry Commission had been established for the purpose of guarding the forests of this State, it certainly seemed as if State lands were the rightful objects of its protection.

In order to make a test case of the matter, I was instructed to proceed to Mariposa County for the purpose of collecting evidence against Jno. R. Hite and Jno. W. Snyder, proprietors of the only lumber mill then in existence in that county. These persons, we had been informed, had removed timber from a certain unentered school section of land.

A few months prior to this time, the United States authorities had sent two special timber agents to this State, whose duty was to investigate all timber depredations occurring on Government lands. As our authority did not extend over these lands, our Board welcomed the arrival of this assistance as exceedingly opportune for the general advancement of forestry work on this coast. Mr. R. W. Anderson, one of the agents just referred to, had shortly before my visit to Mariposa completed an investigation into the illegal cutting of timber on Government land by the same firm of Hite & Snyder. The result of this investigation was the filing of a civil suit by the United States against these persons for the sum of nearly \$100,000, said amount being damages sought for the destruction of timber.

My own investigation concerning this same case resulted in an accumulation of the most complete evidence against Messrs. Hite & Snyder, as to the illegal cutting of some four hundred thousand feet of lumber on school land. This evidence was then referred to Attorney-General Johnson. After a careful examination of the statutes bearing on the subject, the Attorney-General informed us that, in his judgment, the Board possessed no authority to prosecute civil suits against timber depredators. This decision was unexpected, and defeated our hopes of recovering heavy damages from several lumber companies, against whom we undoubtedly had strong cases. In consequence of the above decision, the work of the Board has been greatly cramped. Denied the right to protect Government timber lands, unauthorized to recover damages for trespass on school lands, there remained to us but one remedy at law for timber depredations and fire setting, namely: the right to bring a criminal action against the offender. Unfortunately, the statute of limitations barred the right after the lapse of one year from the commission of the offense. Thus, at the very commencement of our work, the Board found itself handicapped on all sides. However, the mission of such a body is partly to ascertain just where the laws are inadequate and defective, and then endeavor to remedy the same through proper legislation at Sacramento.

This matter I have ever kept in view since my appointment. During this time I have personally investigated cases of alleged timber cutting and fire setting in the Counties of Napa, Sonoma, San Mateo, Santa Clara, Santa Cruz, Mariposa, Fresno, Santa Barbara, Ventura, Los Angeles, San Bernardino, and San Diego. Whenever evidence was obtained sufficiently strong to warrant a prosecution, the action was invariably commenced. Aside from the above work, I have attended to the appointment of local special agents, arranged for the distribution and posting of fire notices throughout the mountain regions, and carried on an extensive correspondence concerning the interests of my particular department.

As to our prosecutions for violation of State statutes concerning forest protection, we have not been successful in obtaining convictions. In no instance has a case been found of trespass on State school lands which was not barred from criminal action by the statute of limitations. A number of excellent cases of illegal timber cutting have been discovered on Government lands, and the evidence secured by us has been referred to the proper Government authorities for action. A number of fire cases have been prosecuted, but the accused have invariably been acquitted. This fact has been extremely discouraging, but it has shown us where the difficulty lay, and how it may be remedied in the future. Under our present law all such cases must be tried before the Justice of the Peace in whose district the offense was committed. As a result, it is impossible to find a jury which is not made up partly or wholly of friends and sympathizers of the accused. I have on several occasions been informed by the Justice presiding, that had the case been tried before himself, instead of a jury, a conviction would have been secured, as the evidence of guilt was clearly conclusive. The defendant is allowed by law the privilege of a trial by jury. It is, therefore, evident that he is not slow to take advantage of a right which lessens his own chances of conviction, and frequently prevents the administration of justice. When the laws cannot be sustained and enforced, it is high time that such statutes should be enacted as will defeat the efforts of those who would disregard the laws of this State, and provide a speedy and effective method for punishing offenders.

In regions where lumbering is the chief occupation, all the inhabitants are dependent principally on this industry for their support. It is cer-

tainly unreasonable to expect to find a jury in such a locality who will have the independence of mind and respect for law to sustain and enforce a statute directed against their own interests. When summoned to decide as to the guilt or innocence of a neighbor charged with fire-setting, they uniformly agree to render a verdict of "not guilty," although I have known them frequently to conclude among themselves that the defendant was really responsible for the fire.

To illustrate the difficulties in the way of securing convictions, I will refer to the case of *The People vs. Robert Gordon*, which was tried in San Mateo County during the early part of this year. The defendant, Gordon, was seen to start a fire in the brush, and then abandon it. The fire rapidly spread, until it had destroyed several thousands of acres of valuable redwood timber. All the circumstances connected with the case went to show that the fire was started for purposes of retaliation. Upon trial the jury were convinced that Gordon was guilty, but acquitted him on the ground that if convicted it would take all of his property to pay the fine. This, the jury considered, would work too great a hardship on the man.

In my opinion, there is but one possible remedy for this deplorable condition of affairs, and that is by changing the place of trial for such cases from the Justice's to the Superior Court. This can be done by amending Section 384 of the Penal Code. The section reads as follows:

Every person who willfully or negligently sets on fire, or causes or procures to be set on fire, any woods, prairies, grasses, or grain on any lands in this State, is guilty of a misdemeanor, and is punishable by fine not exceeding *five hundred dollars*, or imprisonment not exceeding *six months*, or by both such fine and imprisonment.

I would suggest that the words "five hundred dollars" be amended so as to read "one thousand dollars," and that "six months" be amended to read "one year."

These amendments would simply be a revival of the penalty attached to a similar statute enacted in 1872, and constitutes a far more adequate punishment for the offenses referred to. The increased penalty would, under existing statutes, throw the jurisdiction of all such cases into the Superior Court. Then we could reasonably expect to impanel juries whose members reside far enough from the scene of depredation as not to be in sympathy with the defendant or his acts, and therefore more liable to arrive at a verdict, based on an impartial consideration of the facts connected with the case.

The question of forest fires is a serious one for this State. Very few persons understand their destructive power; very few realize the poverty and desolation that follows in the path of such ruinous visitations; and but few pause to consider that in most cases some one person is criminally responsible for this wholesale devastation. During the summer months extensive forest fires prevailed throughout the mountain regions. It is true, some of these are unavoidable, but the vast majority are the result of negligence and carelessness, and their originators should be promptly prosecuted when discovered.

The most destructive fires that I have ever witnessed were set by sheep men, for the purpose of removing chaparral and undergrowth, in order that a crop of grass might result the next season. It is evidently useless to prosecute those whom we believe responsible for the fires, unless they are directly caught in the act. To watch and detect violations of the law would require a large force of patrols, a costly and at present impossible undertaking. As these ranges are mostly on unentered and unsurveyed Government lands, a cheaper and more effective method of procedure

would be to secure the passage of an Act of Congress prohibiting the use of these lands for such purposes. It would then be a comparatively easy task to remove from those regions this nomadic and irresponsible class of men.

Another important source of fires arises from the annual attempts to clear off land, fire being resorted to as the most effective and economical method. The favorite time for clearing land is during the fall months of the year, when the grass and brush will readily burn. The danger from such fires prevails in California to a much greater extent during our prolonged dry season, as all vegetation is then highly inflammable, and the difficulty of controlling fires is thereby greatly increased.

I have seen large areas of territory completely devastated by fire, the result of some careless settler's attempt to clear his land for cultivation. I have seen hundreds of acres of valuable timber blackened and scorched on the mountain sides, standing there as monuments to a reckless and improvident people. It is only when such destruction and loss comes home to one personally, that he truly realizes what danger and waste these fires represent. There are many who claim that fire is indispensable to the successful clearing of land, and that with proper care their spread can be averted. My own observations have convinced me that such claims are overdrawn. In spite of the utmost precaution, and the presence of a large force of men, the rising wind will frequently sweep the fire beyond control, and then the resulting damage is incalculable. Our farmers should feel some degree of protection in their homes, and not live in fear lest through the negligence of some neighbor they should suddenly be deprived of the accumulations of long years. The laws should aim to protect the innocent against such possibilities. It is a poor law that permits danger to menace the toilers of our land, in order that the convenience and profit of others may thereby be favored.

For over thirty years the State of Massachusetts has had a statute in successful operation which strictly prohibits the setting of fires for clearing purposes during those months of the year when danger is to be apprehended from their existence.

California may well imitate her sister State in this respect by enacting a law which will make the setting of such fires a misdemeanor, the prohibition to extend from about the first day of July to the first day of November. This would carry the time beyond the season of dry and scorching weather, and, as a general thing, beyond the first rains. Fires could then be used with but little danger, and the amount of damage greatly lessened. Such a law, rigidly enforced, would annually preserve large areas of forest lands from the ravages of fire as well as protect the property of numerous farmers and settlers who are often the victims of fires set on neighboring ranches and guarded with a negligence that is clearly criminal.

As I have before stated, although our prosecutions have not proved successful from a legal point of view, yet they have accomplished much for the cause of forestry in this State. By their means the existence of a Forestry Commission has been brought home to the people, enlightening them as to the laws against forest destruction and convincing them that depredators will be prosecuted when discovered. This may truly be regarded as a great step in advance of the past attitude of the State with respect to this question. No wide-reaching reform can be effected in a day; the process is slow and tedious. Our State extends over a broad and diversified country. Many places are difficult of access. Time is necessary to thoroughly reach, inform, and convince the people that we are in earnest in this matter.

During the present year we have noticed a vast improvement in matters of forest preservation. Greater care has been observed on all sides. People are beginning to realize that timber lands are worthy of better care and attention; that they should be guarded more sacredly from destruction. Fires are also less numerous, and a more wholesome respect for the law has been created. With proper legislation and efficient management, there is no reason why this State cannot be brought well into line in the economical disposition of its forests.

It is commonly stated in works on forestry, that the destruction of trees and brush on our mountain slopes is inevitably followed by a diminishing of the water supply of that region. My own experience and observation in various parts of this State confirm all such statements. I have seen districts which were formerly well supplied with running streams. The subsequent denudation of neighboring forests by fire caused a remarkable decrease in their water supply. I have met many persons during the past year whose testimony will substantially corroborate my own in this respect. I am satisfied that this State cannot too soon adopt stringent measures to protect the destruction of its forests. By prompt action a great public calamity can be averted.

When the first attempts were made by this Board to enforce the laws against forest destruction, large tracts of State school land were open to entry. Most of this land had been invaded to a greater or less extent by the depredator, who was rapidly appropriating to his own use all timber of value, without which the land was comparatively worthless. Since that time, owing to the aggressive attitude assumed by the Board of Forestry, the entry and sale of these lands has been wonderfully increased, and to-day but little valuable land of this kind remains unsold. It is gratifying to know that the School Fund of this State is coming into rightful possession of the money derived from the sale of these lands; and we believe that to this Board is due much of the credit for bringing about this desirable result.

Among the many disadvantages under which it has been the necessity of the agents of our Board to labor, none has given more trouble and annoyance than that of securing affidavits from witnesses concerning depredations. All timber agents of the United States Government are duly authorized to take such affidavits and administer oaths in person. This is a great convenience to the agent, as he frequently finds himself in remote parts of the country, far from the residence of a proper officer of the law. In framing the statute creating the powers of the Board of Forestry, this important matter was overlooked, in consequence of which it has frequently been necessary to carry a Notary Public or Justice of the Peace for many miles, for the purpose of administering oaths to necessary witnesses. All this involves additional time and expense, and should be remedied in the future. The next Legislature should confer such authority on the officers commissioned by the Board of Forestry as will permit them to take all necessary affidavits and depositions in person.

During the past year a large portion of my time has been occupied in attending to the many business interests connected with the forestry stations at Chico and Santa Monica. In order to extend the work of the Board in the way of experimental forestry, I have made some attempt to increase the number of these stations. To this end I have solicited donations of land, keeping in view the fact that such stations should be located in a different and distinct climatic belt. As a result I have obtained deeds for two finely located stations. One of these is situated near the town of San Jacinto, San Diego County, and is the gift of the Hemit

Land and Water Company. The tract consists of one hundred acres with water rights, its value being estimated at \$15,000. The other station is located near the town of Merced, and comprises forty acres with water rights. The donors of this land are Mrs. A. A. Dunn, V. C. W. Hooper, C. H. Huffman, and the heirs of the Hill estate. At the present time I am negotiating for a station in Livermore Valley, Alameda County, and expect to bring the matter to a successful conclusion.

And now briefly to recapitulate the foregoing suggestions, I will state them as follows:

1. That Section 384 of the Penal Code should be so amended as to fix the maximum penalty at *one thousand dollars*, or *one year's imprisonment*, or by both such fine and imprisonment.

2. That a law should be enacted having the same penalty attached thereto as the preceding, making it a misdemeanor to set fire to any stubble, brush, or forests, for the purpose of clearing land, said law to be in force each year from the first day of July to the first day of November.

3. That all officers and agents commissioned by the State Board of Forestry should be authorized by law to take all necessary affidavits and depositions required by them in the successful performance of their work.

Respectfully submitted.

EDWARD L. COLLINS,
Special Agent for State Board of Forestry.

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REPORT

OF THE

Botanist of the California State Board of Forestry,

J. G. LEMMON.



No. 8.—*Pinus Parryana*, Engelm.—Parry Pine, San Rafael Mountains, Lower California. Alt. 4,000 feet.

1991 0108 11

LETTER OF TRANSMITTAL.

LEMMON HERBARIUM, CALIFORNIA HALL, }
CLAY STREET, OAKLAND, CALIFORNIA. }

To the Honorable, the California State Board of Forestry—ABBOT KINNEY, Chairman; JOHN D. SPRECKELS, WALTER S. MOORE; SANDS W. FORMAN, Secretary:

GENTLEMEN: Herewith I have the honor to submit my first report upon the forest trees of the Pacific Slope, particularly of California.

On the first day of April last, Mrs. Lemmon and myself entered upon the services of your honorable body, a commission being soon after issued to me as Botanist for the California State Board of Forestry, and one to Mrs. Lemmon, as Artist for the same.

We at once set about the duties indicated by our appointments, respectively, holding frequent consultations with the Chairman and other members of the Board as to the amount, character, and kind of investigation desired, resulting in the selecting by us of the order of cone-bearing trees for present study, and for the first season—as being sufficiently large and important—the included family of pines.

While thus limiting the investigation to one class of trees, on the other hand it was suggested by us that the treatment of the California pines practically involved the history of those of the whole natural division of the Pacific Slope, and the scope of our investigations was therefore enlarged to comprise “Pines of the Pacific Slope.”

In the prosecution of our duties we have explored every special forest region of the State—nearly every county—and the result of our collections and studies, added to those of previous labors in the same direction for many years, is shown in accompanying report.

It will be seen that the papers submitted cover a great many topics conceived of as being either directly in line, or at least germane to the leading subjects discussed—our Pacific forests.

After introductory statements treating of ocean currents, atmospheric conditions, and land configuration—the several factors of forest production—a brief general view is taken of the Pacific forests, and especially of the chief of them all, the Sierra Nevada and his Royal Robe. Then follows a Conspectus of the order of Cone-bearers and tables showing distribution, etc., after which the main body of the work is reached—the Pines of the Pacific Slope, giving first a descriptive list of the groups and species.

In this will be found a new classification, to which I call the especial attention of the Board, and of readers generally, as being an attempt to so classify, name, and simplify descriptions as to popularize the study of our interesting pines by the ordinary reader, who is often deterred from such study by the many technical particulars used in most works of instruction or discussion.

Following the “descriptive list” are extended descriptions of each of the California species, including in most instances a history of their discovery. A special investigation of two of our most valuable lumber trees—*Pinus ponderosa* and *P. Jeffreyi*—follow, after which are placed “Pines in Litera-

ture;" and various topics of interest, including the discussion of the microscopic and other abstruse characters which, however, are necessary to a correct and full study of the pines, and are presented in a paper by themselves, "The Diagnosis of the Genus *Pinus*," placed at the end of the report.

Artotype illustrations, twenty-four in number, from photographs taken in the forests of characteristic trees, and from prepared specimens of cones, flowers, leaves, seeds, microscopic cross sections of leaves, etc., taken in our herbarium at Oakland, have been carefully prepared, under the supervision of Mrs. Lemmon, by Britton & Rey of San Francisco, at great expense.

The larger and more elaborate water-color paintings by Mrs. Lemmon, treating closely of details, life size, of our California pines, could not be chromo-lithographed for this report, owing to the much greater expense of such works; but they will be perfected in certain details and augmented by other paintings, completing the series of California pines, when, it is hoped, a future report may be accompanied by these finished and most instructive illustrations.

In order to minimize the typographical errors that would necessarily occur in the hurried work of the State printers of such subjects as botanical descriptions, I have had printed in Oakland, where I could read the proof often and correct the work critically, the "descriptive list" of the pines of the Pacific Slope, a correct copy of which is inserted in place in the manuscript of this report.

ACKNOWLEDGMENT OF AID.

Acknowledgments of important aid are hereby expressed of assistance from a large number of persons and corporations who have kindly assisted in the prosecution of our researches, and the collection of materials, specimens, etc., for this and perhaps other subsequent reports. First of all is the acknowledgment of indebtedness to the Directors and other officials of the Southern Pacific Company's system of railways, who have issued passes and given transportation facilities on their various lines of travel, without which little could have been accomplished by persons of limited means in a vast region like ours, with its many forest headquarters so widely distributed.

The same acknowledgments, but in a less degree, are due for similar reasons to the Atchison, Topeka and Santa Fe railroad system, California Southern, Donahue system, the several Oregon railways, the Pacific Steamship Company, International Land and Transportation Company of Mexico, etc., and the proprietors of several interior stage lines.

Material assistance has been received from Professor E. L. Greene, of the California State University, for the privilege of consulting old authors in his possession, and from Dr. C. C. Parry, of Davenport, Iowa, for same; from Dr. W. H. Harkness, President of the California Academy of Sciences, for the elucidation of tree fungi, and to T. S. Brandegee of same for notes on a new location for *Pinus Torreyana*.

Special acknowledgment of valuable assistance is hereby given the following persons among the many who have aided us in the arduous and prolonged field work:

J. S. Taylor	Del Mar, San Diego County.
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Mrs. Lucy H. Brown	Santa Barbara, California.
Mrs. Fred. Bartlett	Santa Barbara, California.

Mr. and Mrs. Elwood Cooper	Santa Barbara, California.
John Spence, florist	Santa Barbara, California.
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John Nelson	Tehachapi, Kern County.
J. M. Hutchings	Yosemite, Mariposa County.
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W. P. Murphy	San Luis Obispo, San Luis Obispo County.
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Mr. and Mrs. W. R. Rockwell	Starkey, San Luis Obispo County.
Mr. and Mrs. G. W. Brown	Cholame, San Luis Obispo County.
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F. N. Gomez	Monterey, Monterey County.
John Myers	Monterey, Monterey County.
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J. B. Tiffany	Truckee, Nevada County.
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Mrs. R. M. Austin	Quincy, Plumas County.
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Paul Plummer	Tucson, Arizona.
Marmon Brothers	Laguna, New Mexico.
F. W. Peters	Carson, Nevada.
Dr. L. E. Jones	Salem, Oregon.
Prof. C. R. Brown	Portland, Oregon.

The field work has been supplemented by historical data, derived in part from the libraries of the State University at Berkeley, the Public Library of Oakland, and those of the Mercantile, Mechanics, Odd Fellows, and Public Libraries of San Francisco, and other sources.

All of which is respectfully submitted.

J. G. LEMMON,
Botanist for the California State Board of Forestry.

November 1, 1888.

INTRODUCTION.

Pliny, the naturalist, living near the commencement of the Christian era, wrote in one of his thirty-seven books, *Naturalis Historia*, after discussing the two other kingdoms of nature—minerals and animals: "It now remains for us to speak of the vegetable productions which," he declares, "are equally far from being destitute of vital spirit." * * * "It was from the forest that man drew his first aliment; by the leaves from the trees was his cave rendered more habitable, and from their bark was his clothing supplied." * * * "The trees formed the first temples of the Gods, and even at the present day the country people, preserving in all simplicity their ancient rites, consecrate the finest trees in their vicinity to some divinity.

"In more recent times," he continues, "it was the trees that, by their juices and gums more soothing than corn, first mollified the asperities of man; but in addition to this the trees have a thousand other uses, all of which are indispensable to the full enjoyment of life.

"It is by the aid of timber trees that we plow the deep and bring to our stores the wealth of far distant lands.

"It is by the aid of trees that we construct our edifices. The statues of the deities even were formed out of the easily fashioned woods of the forest."

In speaking of resin trees, he says: "Whereas there are in Asia several trees that produce pitch, in Europe there are but six."

Enlarging the observations of the wise old Roman philosopher by the accumulated knowledge of nearly twenty centuries, and circumscribing our view to the timber trees under consideration of the same family as those which Pliny and his predecessors called characteristically, the "pitch trees," we may truthfully say that few orders of plants are of more importance to man at this far riper age of the world, whether we consider them with reference to food, to clothing, for fuel, or for building purposes, than this family of trees we are about to discuss—the noble order of *conifera*, or cone-bearers.

CONIFERÆ, OR CONE-BEARERS.

The cone-bearers mostly inhabit the colder parts of the earth, whether alpine or circumpolar, and are usually readily recognized at sight as resinous, mostly evergreen trees or shrubs, with usually needle-shaped or scale-like, mostly rigid, leaves; the male flowers reduced to stamens only, upon a usually elongated central axis; the female flowers—aments—consisting of few or many scales, becoming in most families a dry *strobile*, or cone. Not a species of them all is either noxious or useless. Most of them are very valuable, and among them are the most beautiful and the noblest trees that clothe the earth.

Climatic Conditions.

The cone-bearers are found almost exclusively in the cold or temperate parts of the earth, the tropical plants of this order inhabiting, mostly, the high parts of the mountains, hence the land surface in the two wide circumpolar regions, north and south, furnishes the principal home of the conifers. In these zones the cone-bearers outnumber the non-resinous, deciduous leaved trees (example, oak, ash) ten to one.

Comparing the two regions, great disparity is found to exist between the characters and the number of the species, those of Australia, New Zealand, and Patagonia differing widely from the more abundant and typical conifers of their antipodes in Northern America, Europe, and Asia.

One suborder and several entire genera, with very numerous species in the northern zone, are entirely absent from the southern one, while in the latter there are found many peculiar genera with, however, a single or but a few species in each.

Again, the separation of the land surface into continents by the great oceans, Pacific and Atlantic, has produced radical changes or modifications of original types, amounting often to generic or family differences.

Continuing this inspection of the habitat of the conifers, equally interesting facts appear by comparing the forest growths on opposite sides of the two continents, Eastern and Western. Confining attention to the Western Continent, remarkable distinctions are detected, owing mainly to the greatly unlike, in fact, diametrically opposite, conditions of the ocean currents that wash its opposite shores, and to the trend of the two principal ranges of mountains that divide its plateaus.

The warm gulf stream passes along northeastward, near the Atlantic Coast, and parallel to the great Appalachian chain of mountains, while the less warm Ku-ro Si-wa, or Japan current, comes down from the northwest and passes along the Pacific Coast parallel with the great Rocky Mountain and Sierra Nevada Ranges.

These dominant currents and ranges, if prolonged, would intersect each other nearly at right angles on the Isthmus of Tehuantepec.

The ocean winds crossing those currents are warmed, and consequently saturated with moisture which, as it is carried inland, meets with the colder land surfaces, especially of high mountains, and is there condensed and precipitated thereon, giving origin to forests.

Where these currents infringe closely upon the coast, and are, moreover, delayed and accumulated by obstructing islands or promontories, as instanced on our northwest coast, *there* we find the greatest precipitation and the noblest forests.

The Gulf Stream passing along near the low, flat coast of Florida and the Carolinas gives origin to a vast, but not dense forest—the Southern pine belt—but as the stream is sheared off into the ocean from the northeastern coast of the United States by the cold counter current from Greenland passing down along the New England coast and as far south as Cape Hatteras, this latter coast is cheated out of much of the nourishing vapor, which, instead, is condensed in fogs upon the banks of Newfoundland, while the great Gulf Stream, coursing on across the Atlantic, warms and saturates other air currents, which, drifting inward, meet with and are precipitated upon the Scandinavian Mountains, giving origin to the noblest forests of Europe—the Norway conifer belt.

Similarly the Japan current, sheared off from Eastern Asia by an Arctic counter current, leaves the Siberian coast shivering and almost treeless, while the great current courses across the Pacific as stated, warming and saturating air currents that fall upon the steep mountain ranges of the Pacific Coast and give origin to the Pacific conifer belts—the noblest and densest forests in all the earth.

In this connection it should be stated that the southern pine belt is prolonged westward from Florida along near the coast of the Gulf of Mexico; also, that there exists (or did exist before the acts of man reduced it) an extensive forest of pine in the Great Lake region, but the conditions favor-

ing the growth of these forests, mainly due to the proximity of large bodies of water, cannot be discussed at this time.

The mountain ranges of the Pacific Slope, being three in number, nearly parallel to the coast and successively higher as they arise farther and farther from it, afford three favoring slopes for vigorous forest growth (those facing the west), and upon these, consequently, are found the noble forests mentioned.

The Rocky Mountain Range, distant over one thousand miles from the Pacific, and also much interrupted, receives but a limited amount of rainfall upon its highest portions. On the peaks and in the parks of Colorado, and the elevated regions north and south of this State, are found limited bodies of pine, fir, and spruce, mingled with deciduous leaved trees, while the steep and lofty continuous Cascade and Sierra Nevada Ranges, and the lower, but ocean-skirting Coast Ranges, arrest and receive the greater part of the vapor, the Cascades presenting the matchless Douglas spruce forests of Oregon, while the lofty, dominating Sierra Nevada is clothed with the magnificent yellow and black pine forests.

Similarly, the Coast Ranges at the north yield a second broad belt of Douglas spruce, while the southern portion in California yields the world-famous redwood forest.

Beginning on the southern coast of Alaska, with an annual rainfall at Sitka of over one hundred inches, and passing southward, the precipitation decreases gradually as the temperature of the land rises, until in Southern California, below Point Concepcion, in latitude 35 degrees, the average of land temperature so far exceeds that of the ocean that precipitation is impossible during the greater part of the year, and a vast interior, non-forested region is the consequence.

The depth or character of soils in the Pacific region has little to do with the exuberance of its forests, as shown by the fact that in the redwood forest of the Mendocino coast, where the trees are largest and closest set, the soil is notably of the poorest sort and very shallow.

Some forms or types of trees have the power to preserve their specific character nearly intact through wide regions both of longitude and latitude. Of such are the Douglas spruce (erroneously called in the north Oregon pine) and the yellow pine, both found not only from end to end of all the Pacific ranges, but reaching across to the Rockies and southward to Mexico.

Others are found on the Coast and Sierra Ranges, but limited in latitude, such as the yellow cypress (*Chemæcyparis Nutkaensis*), the Western hemlock (*Tsuga Mertensiana*), and the California nutmeg (*Torreya Californica*), the latter of the closely allied order Taxaceæ.

In a few instances the separation of the ranges by the great valley of California, one hundred to one hundred and fifty miles wide, the disparity of height and consequent rainfall, results in forms so far different as to entitle them to rank as distinct but closely allied species, as follows:

Coast Ranges.
Abies grandis.
Pinus contorta.
Sequoia sempervirens.

Sierra Nevada.
Abies concolor.
Pinus Murrayana.
Sequoia gigantea.

As might be expected, less but still considerable differentiation results from difference of latitude on the same ranges, amounting, often, to the grade of a species, most frequently to marked varieties.

Several of the cedars at the north become greatly changed in the south, so also of the cypresses, while the firs (by which is always to be understood

the genus *Abies*, of Link; with cones erect, their scales deciduous from the axis) are in the south so far different as to be considered distinct species. It is curious to notice that the lovely red fir of the Cascades, *Abies amabilis*, has for a companion the white fir, *Abies grandis*, while similarly in the Sierra are found the magnificent red fir, *Abies magnifica*, and the white fir, *Abies concolor*, each pair living together like faithful friends.

Also, it is interesting to note in a general way that while the cognate trees may be reduced in size as progress is made southward, the fruit is often enlarged; thus, the noble red fir of the north, with its medium cones six inches long, is replaced in the south by its twin brother with cones eight inches long. Similarly the great Douglas spruce in Oregon, with its immense trunk and small cones one and a half to two inches long, becomes in the mountains of San Bernardino, California, a dwarfed, gnarled tree, but with immense cones eight or nine inches long.

As a matter of teleological or speculative importance, the favorable conjuncture of ocean and continental conditions described as prevailing on the Pacific Coast, have rendered possible the differentiation, or, perhaps, it would be a better statement of the same truth to say the perpetuation of certain lines of development that are wonderfully unique and startlingly local. Reference is had here to the presence of the beautiful *Cupressus macrocarpa* (Monterey cypress), and *Pinus insignis* (Monterey pine), both limited to a few miles along the Monterey coast; the curious bristle-cone fir (*Abies bracteata*), found only in three certain cañons of the Santa Lucia Mountains, of Southern California, and still more suggestive, the commemorative *Pinus Torreyana*, only a few stunted trees of which are found on sand dunes near the town of San Diego, California, with a smaller growth on one of the channel islands.

One other vestige of a vanishing race remains to be noticed, that of the "Big Tree" (*Sequoia gigantea*), a few trees of which, in about twenty scattered groves located on the southern end of the Sierra Nevada, remain on the earth as the majestic vanguard of a past prodigious flora which once flourished here coeval with the colossal animals of the period.

THE SIERRA NEVADA AND ITS GREAT FOREST.

Preeminent over all forestal regions of the earth are the dense and extensive tree growths clothing the slopes of that most diversified and wonderful of mountain ranges—the Sierra Nevada of Western America.

This lofty, steep, well watered range is the headquarters of the largest and most abundant trees known, including most of our lumber-producing pines as well as most of the lumber trees of other families; hence, a general idea of our timber trees and of their forestal importance can be best gained by a study of them *in situ*, as massed or as distributed upon the flanks of this peculiarly wealthy Sierra Nevada.

For the past twenty years it has been the privilege of the writer either to reside in the Sierra or to explore its forests; hence, he is profoundly impressed with their beauty and value, and he shares with the aborigine the sentiments of awe, the veneration, the personation with which he regards the snow-striped Sierra and its kingly garniture of emerald green.

KING SIERRA AND HIS ROYAL ROBE.

The Sierra Nevada is a rich, lordly, bejeweled prince among mountain ranges.

Other chains of mountains ribbing the earth are usually high-raised elevations, composed principally of rounded mountains, swelling their bosoms to the sky and trailing their tattered garments far out over extensive foothills to the flanking plains.

The long Rocky Mountain Range—the backbone of North America—is of this class; rising so gently from the elevated plains on each side, that the traveler by the transcontinental railroads can scarcely discover that he is ascending an immense upheaval of the earth's crust, or detect the exact point where he crosses the broad saddle of the obscure passes.

But our King Sierra is not so. He is distinguished alike by the traveler or the geographer for the abruptness of his majestic uprise from the plain, the splintered and rough-hewn forms of his thousand peaks, the high elevation of their pinnacles, ever bearing their crowns of snow; but most of all he is preeminent for his bounteous and beauteous enrobing forest, his royal, parti-colored garment.

Like an Oriental monarch, he reclines in state upon the bosom of the great, trackless plain of Western America, enwrapped from head to foot, six hundred miles, and from side to side, one hundred and forty miles, with a dense forest of evergreens, interspersed with many-hued, deciduous-leaved trees, like insertions of brilliant figures in a royal emerald robe.

This enrobing forest, the noblest in North America, is perforated along its raised center line, or axis of the Sierra, by a thousand peaks rising through the mantle into the region of perpetual winter, while both slopes, east and west, are rent by a million valleys depressed through the robe into the middle region of changing seasons, and the fringe of the garment trails out over the domain of almost perpetual summer.

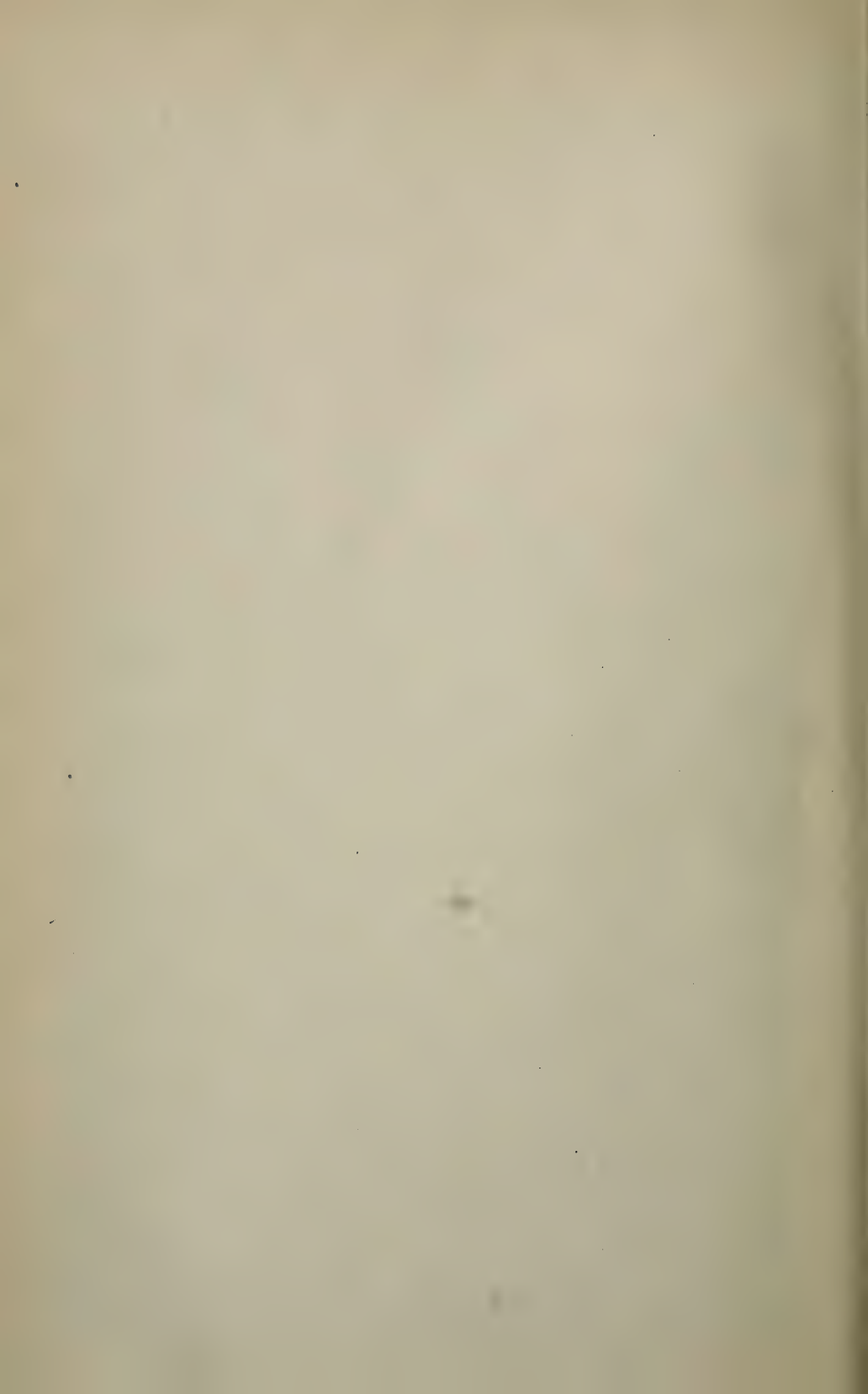
The snow-crowned peaks are the sparkling diamonds of this wealthy prince; the valleys, often still filled with water in their glacier beds, are his resplendent pearls. The former flash upon the voyager floating on the far western Pacific, or the toiler over the wide eastern desert, like beacons of light; but the royal robe, with its decorations of valley and glen, its gems of tree and shrub, flower and fern, reveals itself only to the miner in the cañon, the herdsman with his flocks, the hunter pursuing his game, the curious traveler, or the studious explorer.

But most of all these peculiarities are observed by the lover of nature, he who explores the Sierra with heart attuned and perceptions opened by interior appreciations, for it is an old saying, "Tis the world within creates the world without." Such a visitor's first emotions are often a mingling of disappointment and delight. If he has explored tropical countries he will be disappointed by the fewness of species here, but surprised by the great number of individual trees, their great size and height. If he is familiar with Arctic regions, he will miss the dwarfed trees and monotony so foreign to the Sierra.

Two other comparisons are pertinent. In tropical countries life presses in and strives to hold the ground against fierce, opposing contestants. This is especially observable in the vegetable world. A small spring issuing from a mountain side in Arizona or Mexico is attacked at its very source, and its waters absorbed by the eager rootlets of a hundred species of plants—a broad-headed hackberry or a tall cottonwood crowning the mass of foliage and striking its roots deepest under the rock floor of the spring. Streams large enough to feed all the gourmands by the way, and yet reach



No. 9.—*Pinus contorta*, Dougl.—Scrub Pine, coast of Mendocino, and in cultivation.



the plain, are marked throughout their course by a narrowing border of vegetation.

Shade and northern inclination favor the retention of moisture and foster vegetation, hence the northern slopes of Arizona mountains are often thinly forested, while the southern slopes may be bare to the pinnacles.

In Arctic climes the cold, long winters forbid all but a few specially hardy plants from maintaining existence. The entire surface of the country being kept moist, the plants are not alone found along stream beds, but equally dispersed, varying only by varying conditions of elevation and inclination; hence, the low plains of Arctic America and the tundras of Siberia afford often vast meadows, composed, however, of but one or two species of sedge.

So, also, extensive forests will be found containing but one or two species of trees, these small, dwarfed, and snow-bent, at length reduced to bushes creeping in the mud on the shores of the Arctic Sea.

The Sierra of California occupies a middle position between torrid and frigid conditions, a position most favorable to the production of large forests containing many species of noble trees and rich valleys of diversified flowers.

The Sierra forest is composed mainly of evergreens, not one species of which is identical with the trees of the East—with the exception of a dwarfed variety of an eastern juniper—but it shares several species with the Rocky Mountains on the east and the coast mountains on the west of its position.

Chief of these evergreens is the chief of all trees, the great *Sequoia*, or Big Tree, the bare mention of which is sufficient here.

FIR TREES OF THE SIERRA NEVADA.

Next to the Big Trees in size, but far excelling them in loveliness, are the four species of *Abies*, or fir trees, arranged in pairs, as "red-barked" firs and "white-barked" firs. But they train together oddly; each red fir has a white, smaller brother in attendance, like Don Quixote and his squire Sancho Panza. *Abies nobilis* and *Abies grandis* masquerade as giants through the forests of the northern Sierras, while *Abies magnifica* and *Abies concolor* personate them southward.

The firs until recently were called pines, but they are at once distinguished by their symmetrical shape, especially when young, which is always conical or fusiform. The limbs radiate horizontally in verticils or whorls of three to nine each. The branches and twigs, also the leaves on lower limbs, are all flattened horizontally; hence, the spreading limbs resemble lovely fans which, nearly touching each other at the sides, form stratum after stratum of airy basket work, in a diminishing series from bottom to top.

The cones of the firs are borne on the uppermost limbs, and they stand upright on terminal robust twigs. They are composed of numerous close-set scales, which fall away at maturity, together with the large-winged seeds, leaving the receptacle, or naked core of the cone, persistent upon the tree; hence, fir cones are never found lying about under the trees, as are those of the pine, spruce, cypress, and other trees.

Travelers aver that no trees known exceed the red firs of California in their grand, symmetrical uprise in airy, diminishing wicker-baskets of foliage. One has but to visit a grove of these stately trees, notably around the base of Shasta, to receive impressions of grace, beauty, majesty, and perfection that will serve for mental enjoyment while memory lasts.

SPRUCES OF THE SIERRA.

Next to the firs in conspicuousness are the spruces of the Sierra. There are but two of them, *Pseudo-tsuga Douglasii* (Douglas spruce) and *Tsuga Pattoniana* (hemlock spruce). The spruces differ from the firs principally in having petioled or stalked leaves, cones borne on any of the limbs instead of the upper only, pendulous and with persistent scales. They differ from the pines by having their leaves solitary, not sheathed at base; cones maturing in one season instead of two, the scales without prominences, spines, or prickles.

The Douglas spruce is the largest and principal tree of the Oregon forests, two hundred and fifty to three hundred and fifty feet high and twelve to fifteen in diameter, with a usually fusiform symmetrical shape, black, deeply-cleft, strong bark, and often long, depending twigs of foliage resembling cat's tails. The wood is usually hard, strong, and durable, but varying greatly with age and conditions of growth, giving lumber dealers occasion to apply several names to the timber. In Oregon and vicinity this tree is miscalled "Oregon pine," and is so designated by most dealers elsewhere. The cones are small, oval, two to three inches long, with rounded, convex, smooth scales, and long, narrow bracts exerted three fourths of an inch, and three-parted, the middle segment, or midrib subulate, one half inch long. In the Sierra the Douglas spruce does not attain so great proportions, but is still a very large, majestic, and very valuable tree, much used for lumber, and largely planted for shade and shelter from winds. Growing at elevations from sea level to ten thousand feet, it sometimes forms extensive bodies, to the exclusion of all other species, but is generally attended by other trees, among which it is always distinguished for its bright green foliage, its symmetrical form, its finely drooping branchlets, and beautifully bracted cones.

The Hemlock spruce is less common in the Sierra, being found only near the timber line of the highest peaks. Northward, in the Cascades of Oregon, it becomes a tree of the first class, often attaining a height of one hundred and fifty feet, with a diameter of seven to ten feet. It is a very beautiful tree of pyramidal outline, the lower branches the longest in open situations, diminishing regularly to the top, which ends in a long spire. The limbs at first are directed downward then outward, and at length upward, the twigs again drooping and bearing the small purple cones like thimbles on the ends of widely spreading fingers.

The bark of the Hemlock spruce is thin, strong, grayish, and finely checked; the wood light, soft, close-grained, tough or brittle, varying greatly according to age and conditions. This tree is often called "silver spruce," from the bright sheen given to its foliage by the lines of stomata along its small, short leaves.

One can hardly picture, without experience in our California forests, the exceedingly beautiful effect upon the Alpine landscape, due to the presence of the Hemlock spruce, as it is grouped into silver shields, or bosses, or disposed as tinsel fringe or ruffles along the timber line, with the emerald bands of fir below them, and the deep, sea-green pines with their intervals or insertions of parti-colored, deciduous trees supplementing all, and completing this royal robe.

BRIEF CONSPECTUS OF THE ORDER OF CONIFERÆ OR
CONE-BEARERS.

The cone-bearers are resinous juiced, mostly evergreen trees, with either scale-like or needle-shaped leaves; flowers of two sorts, male or pollen bearing, and female or fruit bearing; these either separated and upon the same trees or upon different trees, the female consisting of very much modified leaf organs having the form of scales or membranes, with contained seeds, becoming a dry cone in fruit (or berry-like in juniper) seeds two or more, naked or winged, embryo straight, in oily albumen; cotyledons generally several in a whorl.

The cone-bearers are divided into three tribes: CUPRESSINÆ, TAXODINÆ, and ABIETINÆ.

TRIBE I—CUPRESSINÆ.

Scales of the fertile aments, opposite, in pairs, becoming a small dry cone, or a drupe-like berry in juniper; leaves opposite or ternate, often dimorphous.

A large tribe of five genera: *Juniperus*—the junipers; *Cupressus*—the cypresses; *Chamæcyparis*—the hemlocks; *Thuya*—white cedar; *Libocedrus*—incense cedar.

TRIBE II—TAXODINÆ.

One genus only: *Sequoia*—big trees,

TRIBE III—ABIETINÆ.

A large tribe of five genera:

No. 1. *ABIES*—The fir family: Leaves sessile leaving circular scars when they fall; cones erect on the upper limbs, their scales deciduous from the axis; seeds with resin vesicles.

No. 2. *PSEUDO-TSUGA*—Douglas spruce: Leaves petioled (stalked), the scars transversely oval; cones pendulous; scales persistent; seeds without resin vesicles.

No. 3. *TSUGA*—Hemlock: Branchlets rough from the prominent persistent leaf bases; bracts of the cone smaller than the scales; cones pendulous; seeds with resin vesicles.

No. 4. *PICEA*—Spruces: Trees having also the characters of the last, except leaves sessile; seeds without resin vesicles.

No. 5. *PINUS*—Pines: Cones requiring two years to complete their growth, their bracts becoming corky and thickened, leaves (the conspicuous foliage) in fascicles of two, three, or five (solitary in one species), and surrounded at base by a sheath of scarious bud-scales; pollen, two-lobed.

DISTRIBUTION OF THE CONIFERÆ.

The cone-bearers of the Pacific Slope, classed in three sub-orders or tribes, as shown in the foregoing, comprise fourteen genera and fifty-two species.

They are distributed as hereafter shown. For convenience the mountains of the whole Pacific region are divided into two sections by a conventional line drawn eastward from the Bay of San Francisco, with a supplemental southern region divided between Arizona and New Mexico.

Northern Coast Ranges possess	21 species.
Southern Coast Ranges possess	21 species.
Total.....	42 species.
Northern Cascade Mountains possess	16 species.
Southern Cascade Mountains possess	13 species.
Total.....	29 species.
Northern Sierra Nevada Mountains possess	20 species.
Southern Sierra Nevada Mountains possess	22 species.
Total.....	42 species.
Northern Rocky Mountain range possesses	17 species.
Southern Rocky Mountain range possesses	11 species.
Total.....	28 species.
Arizona mountains possess	13 species.
New Mexican mountains possess	12 species.
Total.....	25 species.

The species found in the several districts are shown in the following table:

HABITAT.	Coast Range N.	Coast Range S.	Cascades N.	Cascades S.	Sierra N.	Sierra S.	Rockies N.	Rockies S.	Arizona	New Mexico
CONIFERS OF THE PACIFIC SLOPE.										
Libocedrus decurrens—incense cedar		1		1	1	1				
Thuja gigantea—red cedar	1		1				1			
Chemæcyparis nutkaensis—Sitka cypress	1		1							
Chemæcyparis Lawsoniana—Port Orford cedar	1				*1					
Cupressus macrocarpa—Monterey cypress		1								
Cupressus Goveniana		1			1					
Cupressus McNabiana		1								
Juniperus Californica and var. Utah		1				V.1			V.1	
Juniperus occidentalis and vars.				1	1	1		V.1	V.1	V.1
Sequoia gigantea—big tree						W.1				
Sequoia sempervirens—redwood	1	1								
Taxus brevifolia—yew	1	1			1	1	1			
Torreya Californica—California nutmeg	1	1			1	W.1				
Pinus monticola—mountain pine	1		1		1	1	1			
Pinus Lambertiana—sugar pine	1	1	1	1	1	1				
Pinus flexilis—white pine						1	E.1		N.1	1
Pinus albicaulis—white stem pine	1		1		1	1	E.1			
Pinus reflexa—Arizona white pine									N.1	1
Pinus Parryana—Parry's pine		1								
Pinus cembroides—nut pine									1	
Pinus edulis—"Piñon" nut pine								E.1		1
Pinus monophylla—Washoe pine						E.1				
Pinus Balfouriana—foxtail pine					1			1		
Pinus aristata—bristle-cone pine						1		1	1	1
Pinus Torreyana—Torrey's pine		1								
Pinus ponderosa—yellow pine	1	1	1	1	1	1	1	1	1	1
Pinus Jeffreyi—black pine					1	E.1				
Pinus Arizona—Arizona pine									1	1
Pinus Chihuahuana—Chihuahua pine									1	1
Pinus contorta—scrub pine	1									
Pinus Murrayana—tamarack pine			1	1	1	1	E.1	1	1	N.1
Pinus Sabiniana—gray leaf pine	1	1			1	1				
Pinus Coulteri—big-cone pine		1				1				
Pinus insignis—Monterey pine		1								
Pinus tuberculata—knob-cone pine	1	1		1	1	1				
Pinus muricata—prickle-cone pine	1	1								
Picea alba—white spruce	1						1			
Picea Engelmanni—spruce			1	1			1	1	1	1
Picea pungens—blue spruce							1	1		
Picea Sitchensis—tide land spruce	1									
Tsuga Mertensiana—hemlock	1	1	1	1			1			
Tsuga Pattoniana—hemlock			1	1	1	1	1	1		
Pseudo-tsuga—Douglas spruce	1	1	1	1	1	1	1	1	1	1
Pseudo-tsuga—var. macrocarpa		1				†1				
Abies sub-alpina—balsam fir			1				1	1		
Abies grandis—N. white fir	1			1			W.1			
Abies concolor—S. white fir				1	1	1		1	N.1	N.1
Abies bracteata—bristle-cone fir		1								
Abies amabilis—beautiful fir			1	1						
Abies nobilis—noble red fir	1		1		*1					
Abies magnifica—great red fir					1	1				
Larix occidentalis—tamarack			E.1				W.1			
Larix Lyallii—Oregon tamarack			1				1			
Totals in each division	21	21	16	13	20	22	17	11	13	12

* Shasta. † San Bernardino.

Twenty-three pines, 18 in California; 5 cypresses, all in California; 5 spruces, 3 in California; 7 firs, 5 in California; 4 cedars, all in California; 2 junipers, both in California.

NOMENCLATURE.

In the infancy of botanical science, and indeed until very recently, the word "pine" was applied not only to true pines as we now know them, but to spruce, fir, larch, and cedar as well, and "pine" is still so employed in Europe by most travelers, artists, and poets.

Lately botanists have detected important lines of development separating the true pines from the other families, but while the pines now are usually quite readily distinguished, the numerous species—now over seventy-five known to science—differ so little from their nearest allies that satisfactory classification of them involved an immense amount of collecting, research, and comparison, resulting at present in a very natural method of classification.

The earliest classifications were based upon the number of leaves in a fascicle, making one group with leaves in twos, another in threes, and the third in fives, while subdivisions depended upon the size of seeds, their condition, whether "wingless" or "winged," etc., all of which failed of certainty.

Endlicher, in 1847, first discovered that the cone scales afforded important distinctive characters for separating the large family into two sections. But the subdivisions of Endlicher and his followers were based upon the number of leaves in the fascicles, size of seeds, etc., distinctions that are inconstant and so this classification was faulty.

The late Dr. George Engelmann devoted over fifty years of a busy life to the elaborate study of certain abstruse families of American plants, including nearly all our forest trees, and with most profound and gratifying results, published from time to time, especially in classifying our cone-bearers.

He found with Endlicher that the characters of the fruit scales were of first importance, and, moreover, that they correspond with series of other characters, which constitute two very natural sections of the genus, especially the characters of the wood, popularly separating the family into white pines and pitch pines. Subsections of these he based upon his lately discovered microscopic characters of the leaves; especially the position of the longitudinal resin ducts within them.

These he found were in three relative positions as regards the surface: (1) peripheral, near the epidermis; (2) parenchymatous, imbedded in the fundamental tissue; or (3) internal, on or near the central fibro-vascular bundle.

Subdivisions of these groups, again, were determined by the position of the cones as being either (1) subterminal, near the leaf-bud; or (2) lateral, along the side of the growing shoot; and lastly (what was first with the early botanists), the number of leaves in a sheath, their persistence, and the persistence of the cones, was considered.

Accepting the most of Englemann's conclusions with profound gratitude, but at present disregarding his microscopic distinctions as being too recondite or too troublesome for the general reader, I offer a new classification of Pacific species based chiefly upon plainly evident characters of the cone, subsequently noting the other characters in the order of their importance.

Readers desirous of pursuing the technical histology of the subject farther are referred to the "Diagnosis of the Genus Pinus" at the end of these contributions.

PINES OF THE PACIFIC SLOPE.





No. 12.—*Pinus Jeffreyi*, Murr.—Black Pine, *var. Peninsularis*, San Rafael Mts., Lower California. Alt. 4,000 feet.



PINES OF THE PACIFIC SLOPE.

PARTICULARLY THOSE OF CALIFORNIA.

By J. G. LEMMON, Botanist for the California State Board of Forestry.

A NEW CLASSIFICATION WITH NAMED DIVISIONS, GROUPS, ETC., BASED UPON
PLAINLY EVIDENT CHARACTERS, CHIEFLY OF THE FRUIT OR CONE.

"By their fruits ye shall know them."

WHAT ARE PINES?

Briefly: A pine tree usually affects a cold or temperate climate, and is usually readily distinguished as a resin-producing, cone-bearing evergreen tree, with principal foliage composed of secondary leaves, which are acerose (needle-shaped), usually rigid, mostly triangular, and in fascicles or bundles of 2-5 each (solitary and round in one species), their bases surrounded by a sheath of scarious bracts or bud scales, usually close-wrapped and persistent.

The flowers are *monœcious*, *i. e.*, they are on the same tree but separated, the male or pollen-bearing on a different branchlet from the female or fruit-bearing one which becomes the cone. The fruit is either sub-terminal, *i. e.*, arising near the terminal leaf-bud, or it is lateral, arising along the stem among the leaves of the growing shoot. It is composed of numerous spirally-imbricated, carpellary scales, each in the axil of a thickened, corky bract (much modified and concealed at maturity), and each bearing two, usually long-winged, seeds at base; the whole fruit requiring two years to complete its growth (three for one European species), and becoming a coriaceous (leathery) or ligneous (wood-like) *strobile* or cone. Cotyledons or seed-leaves numerous, in a whorl of 4-16.

The pines are naturally divided into two classes or sub-genera, called technically, *strobis* and *pinaster*, respectively, from the name of typical species in each; in this publication given also other names.

CLASS I. SMOOTH-CONED, WHITE PINES.

(SUB-GENUS STROBUS of Botanists.)

Cone-scales smooth, devoid of protuberances, prickles, or hooks; wood usually lighter colored, softer, and less resinous than that of the other class. (Exception: our Sugar Pine is often very resinous.)

Cone sub-terminal, mostly long-peduncled and falling at maturity; scales usually numerous and flat. Leaves short, 2-3 inches long, in fascicles of fives each, with short, loose, deciduous sheaths at the base. Male flowers oval, small, $\frac{1}{4}$ - $\frac{1}{2}$ inch long; scales 8-15.

Five species on the Pacific Slope, four of them in California, arranged in two groups of a pair each.

GROUP 1. LONG-CONE, LUMBER PINES.

Cone long, cylindrical, 8-20 inches long, and 1-3 inches thick, many-sealed, long-peduncled, becoming pendent. Principal spirals, 8 inclining to the left, 13 to the right. Seeds large, dark, with long, brown, persistent wing.

Trees usually very large, with finely-checked bark, large and long upper, bearing limbs and light green foliage. Timber of the utmost value for lumber.

No. 1. *Pinus monticola*, Dougl.—Mountain Pine, Finger-Cone Pine.

Sub-alpine, middle-sized, lighter-barked trees than the next, rare in the Sierra and northward. Bark fissured into small square checks. Yearling cones cylindrical, an inch long. Mature cones narrow, 6-12 inches long; scales thin, weak, reflexed at maturity. Seeds and wings smaller and paler than those of its mate. Cotyledons 6-9. Closely resembling Eastern White Pine (*P. strobus*).

Variety *minima*—Little Mountain Pine. Trees and fruit very small; bark thin, smooth, white. Northern cross-ranges and coast mountains, rare.

No. 2. *Pinus Lambertiana*, Dougl.—Sugar Pine, Gigantic Pine.

Trees often of the largest dimensions 120-300, or, favorably situated, 250-300 feet high and 6-10, rarely 15-20 feet in diameter. Scattered among other trees of the coast mountains and Sierra at middle elevations. Bark thicker, darker than the preceding, and irregularly fissured. Yearling cones long, yellowish or purple, cylindrical, 1-2 inches long with appressed scales. Mature cones long-elliptical, 10-12, rarely 15-22 inches long and 2-3 thick, becoming when expanded 4-6 inches thick. Seeds very large, about $\frac{1}{2}$ inch long, edible, with large wings an inch long and thickly veined with reddish brown.

The sugar pine is the most distinguished and valuable of western pines and far exceeds in dimensions any other member of the family.

Variety *minor*—Little Sugar Pine. Tree and fruit small; bark thin, very finely checked or smooth, and whitish. Northern coast mountains and the Sierra, rare.

GROUP 2. DWARF-CONE, ALPINE PINES.

Dwarfed, often depressed trees, forming the upper fringe of alpine forests in the Sierra and northward. Cones sub-cylindrical or ovate, shorter, with fewer scales, 2-6 inches long. Seeds large, nearly wingless. Bark thinner and lighter colored than the first group.

No. 3. *Pinus flexilis*, James.—Limber-Twig Pine, Western White Pine.

Trees of the Rocky Mountains, a few in the Southern Sierra about the headwaters of Kings River; often depressed to flat, dense, scarcely yielding platforms. Yearling cones, one inch long, purple. Mature cones, 4-6 inches long. Twigs very flexible, yielding to pressure from snow, ice, and wind.

No. 4. *Pinus albicaulis*, Engel.—White-Bark Pine, Creeping Pine.

Dwarfed, very white-barked trees of the Northern Rocky Mountains and rare in the high Sierra, notably forming the timber line of Shasta. Year-

ling cones globular, $\frac{1}{2}$ inch long, dark purple. Mature cones small, sub-globose, $1\frac{1}{2}$ –2 inches long, deep purple until maturity. Seeds pale, nearly globular.

(To this class belongs also *Pinus reflexa*, Engel., of the high mountains of northern Arizona; a tree resembling *P. monticola*, but with thicker cones, the long, spoon-shaped scales of which are reflexed at the apex, the seeds large and nearly wingless like the second group.)

CLASS II. ROUGH-CONED, PITCH PINES.

(SUB-GENUS PINASTER of Botanists.)

Cone-scales rough, armed with conspicuous protuberances, prickles, or hooks. Wood usually darker, harder, more resinous than that of the first class. (Exception: Our thin-bark pine has very white wood.)

Eighteen species on the Pacific Slope, fourteen in California, in two Sections of two Groups each, and an intermediate solitary species.

SECTION A. SUB-TERMINAL, MOSTLY DECIDUOUS-CONED, HARD PINES.

Cones arising near the terminal leaf-bud, and, at maturity, separating from the stem either below or just within the base.

Eleven species on the Pacific Slope, eight in California, in two very unequal groups.

GROUP 3. ENTIRE-CONE, CLOSE-GRAINED PINES.

Cone small, remaining whole at maturity, separating regularly from the peduncle. Leaves short. Male flowers very small; scales 4–6.

Three distinct pairs of species.

FIRST PAIR. OBLONG-CONE, PLUME PINES.

Cones oblong-cylindrical, 3–5 inches long, $\frac{1}{2}$ – $1\frac{1}{2}$ thick, pendent from the ends of the long branchlets; scales numerous, and nearly flat; leaves mostly in fives—persisting for many years, 10–20, very short and appressed to the branchlets, whence the resemblance to plumes—sheaths loose, deciduous.

Sub-alpine, spire-shaped trees of the Rocky Mountains, with a few groves in the high Sierra. Wood reddish, cross-grained, and exceedingly tough. Bark reddish-brown, deeply fissured.

No. 5. *Pinus Balfouriana*, Jeffrey.—Fox-tail Pine, Spruce Pine.

Medium sized tree, at a distance suggesting a spruce with its long drooping limbs. A few trees at an altitude of 7,500 feet forming a dark-green belt on the south flank of one of the eastern spurs of Scott Mt., 20 miles west of Shasta, where Jeffrey detected it in 1852 (rediscovered by the writer, in 1878); only other California localities, a few trees near the headwaters of Kings River, in the Southern Sierra. Yearling cones deep brown, $\frac{3}{4}$ inch long. Mature cones 3–6 inches long, dark purple with small, recurved, persistent (not “deciduous”) prickles standing in a depression of the scale; seeds pale, beautifully mottled above with brown; wings an inch long, numerous veined with brown.

No. 6. *Pinus aristata*, Engel.—Bristle-Cone Pine, Hickory Pine.

Similar but usually smaller trees, 40–100 feet high, and 2–4 in diameter. A few trees only in the Southern Sierra, but more common in the mountains

of Northern Arizona, New Mexico, Nevada, Utah, and Colorado, at 7,000–10,000 feet altitude. Yearling cones purple, $\frac{3}{4}$ inch long. Mature cones shorter but with many more scales than the other species, with prominent scale-tips armed with usually long, incurved or twisted, weak, bristle-like prickles; seeds smaller, paler, with shorter $\frac{1}{2}$ -inch, incurved, transparent wings. Generally classified as a variety of the preceding but well entitled to specific rank upon the distinctions named. (See extended description for further remarks.)

SECOND PAIR. GLOBE-CONE, NUT PINES.

Cones sub-globose, $1\frac{1}{2}$ –2 inches long, scales few, very protuberant and unarmed, widely opened at maturity. Seeds very large, wingless, and edible. Favorite Indian food. Leaves heavy-scented, with loose deciduous sheaths.

No. 7. *Pinus monophylla*, Torr. & Frem.—Single-Leaf, Fremont's Nut Pine.

Small, branching trees on the Eastern Slope of the Sierra and southward. Leaves white-glaucous, solitary, round, and spine-pointed. Cones two inches long with hard-shelled seeds. The solitary leaves of this species not elsewhere known in the Pine family.

No. 8. *Pinus Parryana*, Engel.—Parry Pine, Mexican Piñon.

Trees similar but smaller. On the mountains of Lower California, a few trees crossing the boundary into San Diego County. Cones smaller, with soft-shelled seeds. Leaves in fascicles of 4 or 5.

(To the Nut Pines belong also *P. edulis*, Engle., of New Mexico, similar in appearance and fruit but leaves mostly in pairs; and *P. cembroides*, Zucc., of Northern Arizona, very small trees and small, few-scaled cones, but seeds larger and leaves 2–5.)

THIRD PAIR. THIMBLE-CONE, THIN-BARK-PINES.

Cone very small, 1 – $2\frac{1}{2}$ inches long, strongly declined, falling at maturity or persisting indefinitely. Male flowers are very small; leaves in pairs; seeds and wings very small. Trees with exceptionally thin bark and white, soft wood.

No. 9. *Pinus contorta*, Dougl.—Scrub Pine, Twisted Pine.

Small, scrubby trees in swamps of the northern sea coast. Yearling cones globular, minute, $\frac{1}{4}$ inch long, with pointed, spreading scales. Mature cone sub-cylindrical 1 – 2 inches long, very strongly declined and long persistent, at length almost concealing the foliage. Seed minute with very small, narrow wing. A curious dwarf pine that would prove ornamental for hedges or in lawns and parks.

No. 10. *Pinus Murrayana*, Balfour.—Tamarack Pine, Murray Pine.

Usually tall, slender trees in wet sub-alpine valleys of the Sierra and Rocky Mountains. Yearling cones globular, $\frac{1}{4}$ inch long, with pointed, spreading scales. Mature cones ovate-conical, $1\frac{1}{2}$ – $2\frac{1}{2}$ inches long, less strongly declined, and usually deciduous. Beautiful trees when in open situations. Bark only $\frac{1}{4}$ – $\frac{1}{2}$ inch thick. Trees much attacked by parasites and other enemies, and so discharging resin or pitch, hence often called "Pitch Pines."

(To this Pair is closely connected an outlying species—*P. Banksiana*, Lamb, often confounded with *P. Murrayana*, and found in British Columbia, 150 miles from our boundary. This is the "Gray Pine," of Canada and the Eastern States, with its very small, narrow, persistent cones curiously incurved like little horns in the direction of the apex of the stem—the only cones of this character known.)

GROUP 4. BASE-BROKEN-CONE, LUMBER PINES.

Cone breaking away at maturity by a transverse fracture within the base, rendering it thereby truncate (*i. e.*, cut-away) at the base, and leaving persistent on the limb, its undeveloped, basal scales. The cones are ovate-conical, sessile or nearly so, spreading or slightly declined, many-scaled—5 spirals inclining in one direction, 8 the other. Seeds about $\frac{1}{2}$ an inch long, wings about an inch long, transparent, beautifully veined with brown. Leaves in threes, and 5–8 inches long, sheaths long, close-wrapped, and persistent. Male flowers large and long, scales 10–12. Bark usually very thick and deeply fissured into large sections.

Trees of the largest dimensions, widest distribution, and of the utmost value for lumber, fuel, etc.

One pair of species, each with three varieties.

No. 11. *Pinus Ponderosa*, Dougl.—Yellow Pine, Heavy Pine.

Trees of the largest size, 120–200, not rarely 250–300 feet high, and 4–10, rarely 15–20 feet in diameter. Headquarters of greatest development in the Sierra Nevada, with marked varieties or sub-species distributed over the mountains of the Pacific Slope, and eastward to the Rockies, and the Black Hills (Dakota), and southward through Arizona and New Mexico to the northern States of Mexico. Bark in the typical form, whitish-yellow, very thick and deeply fissured longitudinally, into large plates, very flakey, but in the varieties darker, thinner, and harder. Sap-wood usually thin, of few layers, whitish; heart-wood correspondingly abundant, yellowish. Yearling cones, green, oval or elliptical, $\frac{1}{4}$ –1 inch long, with pointed, appressed scales. Mature cones conical-ovate 2–5 inches long (slightly truncate at base after falling), of usually a rich brown color, when ripe the scales spreading; prickles small, erect or incurved. Male flowers 2–3 inches long, flexuous, reddish purple.

Variety (a) *Benthamiana*, Hartweg—Foothills Yellow Pine: Coast mountains, and western foothills of the Sierra. Usually smaller trees than the typical species with darker, thinner bark, and longer, slim cones green until maturity, then leather-brown.

Variety (b) *scopulorum*, Engel—Rocky Mountain Yellow Pine: Rocky Mountains and Black Hills (Dakota). Medium sized trees with darker bark and smaller fruit than the typical. Leaves shorter, often in pairs.

Variety (c) *brachyptera*, Engel—Southern Yellow Pine: Highest mountains of Arizona, New Mexico and southward. Trees and fruit medium sized. Bark thinner than the typical and divided into smaller plates. Foliage thin.

(See extended description for remarks upon varieties.)

No. 12. *Pinus Jeffreyi*, Murray.—Black Pine, Sap-wood Pine.

Similar, but never so large trees as the typical forms of the other species, usually more spire-shaped and symmetrical. In the Sierra, with a variety southward to Lower California. Bark dark, often reddish or black, and hard, fissured into small plates. Sap-wood usually very thick, often composing

the most of the timber, whitish; heart-wood consequently meager, not so light colored as the other species, often very resinous. Yearling cones purple, larger, elliptical, $1-1\frac{1}{2}$ inches long with larger prickles, which are strongly deflexed. Mature cones usually much larger and more truncated, elongated 5-6, often 8-10 inches long, and half as wide when expanded; prickles strongly deflexed, giving one of the early names of the variety. Leaves mostly larger, and with its branchlets usually glaucous, the latter when bruised giving off a fragrance resembling oil of orange (Sargent). Male flowers shorter, $1-1\frac{1}{2}$ inches, but thicker and yellowish. (See extended descriptions.)

Variety (a) *nigricans*—Black-Bark Pine: Timber very sappy. Bark black. Leaves and branchlets glaucous. In the Sierra at low altitudes, often in wet localities. Most common form.

Variety (b) *deflexa*, Torr.—Red-Bark Pine: In the Sierra and southward at usually higher altitudes, often very large trees. Timber less sappy. Bark reddish. Yearling cones purple.

Variety (c) *peninsularis*—Peninsular Pine: On the highest, central range of mountains in the Peninsula of Lower California. Large trees, fruiting abundantly, with large, mahogany-colored fallen cones. Timber qualities unknown.

(The original locality of Jeffrey's discovery is in the regions of Mount Shasta, north and west, the trees being of large size on moraine soil, with large, long, drooping limbs; bark reddish-black and thick; cones very large, elliptical, 8-10 inches long, with numerous scales, dark purple until maturity, then leather-brown, with strongly deflexed (not "in-curved") spines. Seeds large, mottled above, with nearly transparent brown-veined wings. This form must be taken as the true type of *P. Jeffreyi*, both on account of its first discovery and also of its first origin in time, on the moraines and exposed slopes soon after the Glacial Epoch.)

To this 4th group (The Broken-Cone Pines) belongs also the lately detected *P. Arizonica*, Engel., of the high mountains of Northern Arizona, a small tree resembling *ponderosa* var. *Benthamiana*, but smaller, with cones 2-4 inches long and its leaves in fives—distinguished principally by the latter character.

SECTION B. MOSTLY LATERAL, PERSISTENT-CONED, COARSE-GRAINED PINES.

Cone lateral, *i. e.*, arising along the bearing shoots usually at some distance from the apex; verticillate or clustered and declined, mostly not falling at maturity but persisting and either becoming inclosed by the later layers of wood, or, the peduncle is stretched and, at length, broken by the enlargement of the tree and the cone is carried outward confined in the bark.

Seven species on the Pacific Slope, six in California, mostly near the coast, in two unequal Groups, a pair and a trio, with a solitary species between them.

GROUP 5. HEAVY, SPINE-CONE, LONG-LIMBED PINES.

Cone of the heaviest, largest, and hardest description, on long, stout, spreading peduncles, opening at maturity and scattering the seeds, but usually remaining persistent until forced off by the enlargement of the tree, then leaving, often, a few basal scales persistent. Scales very large, broad and thick, terminating in long, stout incurved hooks. Seeds large, black, and thick-shelled, edible. Leaves in threes, very long. Male flowers an inch long, scales 10-15.

Picturesque trees remarkable for their usually divided trunk or very long limbs and for their very heavy, spine-bearing cones.

No. 13. *Pinus Coulteri*, D. Don.—Big-Cone Pine, Coulter's Pine.

Trees usually larger than those of the next species, with dark-green, abundant foliage, found in a few cañons and other sunny localities of the interior coast mountains, from Mount Diablo to Santa Inez and San Bernardino. Leaves, the largest known, 8-14 inches long and $\frac{3}{4}$ of a line wide. Yearling cones, 1-2 inches long, with shorter appressed scales. Mature cones elongated, elliptical, of matchless size and weight, 15-20 inches long, half as thick, and weighing 5-8 pounds. The large scales more gradually tapering than the other into the large unexampled, incurved hooks, which on the upper (outer) side near the base are $1\frac{1}{2}$ - $3\frac{1}{2}$ inches long. The seeds are, quite unexpectedly, smaller, about $\frac{1}{2}$ inch long and one half as wide, but with large broad wings, $1\frac{1}{2}$ inches long.

Well named, but too late, *P. macrocarpa*, by Lindley, the size and weight of the cone being unprecedented. Small forms of this tree may be mistaken for robust specimens of the other, but the characters of the seed given will always separate them.

No. 14. *Pinus Sabiniana*, Dougl.—Gray-leaf Pine, Sabine's Pine.

Trees of the hot interior foothills with divided or branching habit and usually light grayish, glaucous foliage, which is usually scant, mostly gathered at the ends of the leading, upper shoots, the other branchlets poorly provided with few, weak, at length drooping leaves. Yearling cones globular, an inch long with long spreading, hook-like scales. Mature cones heavy, 2-5 lbs., broadly ovate, 4-10 inches long, the stout hooks abruptly tapering to the point, 1-3 inches long, the longest being at the base on the outer (upper) side. Seed very large, sub-cylindric $\frac{1}{2}$ - $\frac{3}{4}$ of an inch long, jet black, with a very thick, hard shell and a delicious kernel, formerly much used for food by Indians, giving this tree the poor name of "Digger Pine." Wings very short, the thick base one-fourth-enveloping the seed with its broad rim.

INTERMEDIATE SOLITARY SPECIES.

No. 15. *Pinus Torreyana*, Parry.—Torrey Pine, Lone Pine.

A few small trees buffeted, often prostrated, by ocean winds on the bluffs at Del Mar, San Diego County; and a smaller number (about 100) detected the present season (1888) by T. S. Brandegee on the east (the shore end) of Santa Rosa Island, 120 miles north of the other locality.

Leaves in fives very large and long, 8-12 inches. Male flowers yellowish, the largest known; $1\frac{1}{2}$ -2 inches long and $\frac{1}{4}$ - $\frac{3}{8}$ thick, scales 14. Yearling cones globular, $\frac{1}{2}$ an inch long on peduncles 1-2 inches long. Mature cones broadly ovate, 4-6 inches long, and very heavy, 1-2 lbs., with broad, thick scales, armed with short, quadrangular, pyramidal, obtusely pointed prickles. Seeds very large, ovate, sub-cylindrical, $\frac{1}{2}$ - $\frac{3}{4}$ of an inch long, the shell very thick and hard, the kernel edible; wings short, very thick at base and encasing the seed like the setting of a jewel. Cones persisting until the 4th season and retaining the lower portion of their seeds, although opened the second autumn preceding.

A singular, very limited, perhaps expiring species, over 50 miles from any other pine, in many respects resembling the historic *Pinus pinea* of the ancients, which has been cultivated from time immemorial.

GROUP 6. LONG-CLOSED CONE, SLENDER PINES.

Cones in verticils or clusters of 2-7, often more than one set on the same year's shoot: usually strongly declined, hard, heavy, oblique and gibbous, on account of the outer scales near the base bearing strong knobs or tubercles, but unexpectedly, these not perfecting their seeds; the rest of the scales flat, or nearly so, and bearing the perfect seed. The cones are usually long—persistent, confined in the bark, and *serotinous*, i. e., they remain long closed, retaining the small rough or tuberculated seeds with their vitality unimpaired for an indefinite number of years. Leaves of medium size, 3-6 inches long. Male flowers very small, on branchlets, with leaves above them like the Australian bottlebrush; scales, 6-10.

Small trees, mostly crowded into dense groves, hence, tall and slender; but broad-crowned or rounded if unrestrained.

No. 16. *Pinus insignis*, Dougl.—Monterey Pine, Remarkable Pine.

Beautiful trees of medium size, extremely local, with headquarters at Point Pinos, on Monterey Bay, and extending along near the ocean from Pescadero to San Simeon Bay, with an outlying variety (?) *binata*, on the Island of Guadalupe, 600 miles southward. Leaves in threes, rather slender, bright green. Yearling cones an inch long, early gibbous with the enlarged scales. Mature cones ovate-conical, 3-5 inches long, tubercles at base outside large, hemispherical; prickles very small, deciduous. Seeds pale, strongly reticulated with brown; wings an inch long, beautifully veined with reddish-brown. Bark thick, fissured, very hard, black without, bright red on the inner face.

Very interesting trees freely growing upon the but-recently-moving, light sand dunes of the sea. Readily yielding to cultivation and very fast growing, annual layers are often seen $\frac{1}{2}$ – $\frac{3}{4}$ and even a full inch thick.

The Monterey Pine has been often classified as *P. radiata*, Don., but this name was founded upon a large coned form, and is, therefore, here used to indicate that variety. (See extended descriptions.)

Variety (a) *radiata*, Don.—Spreading-Cone Pine: The large-coned form of Monterey Pine, with shorter, thinner leaves than the typical (Gordon). Mostly southward from Point Pinos.

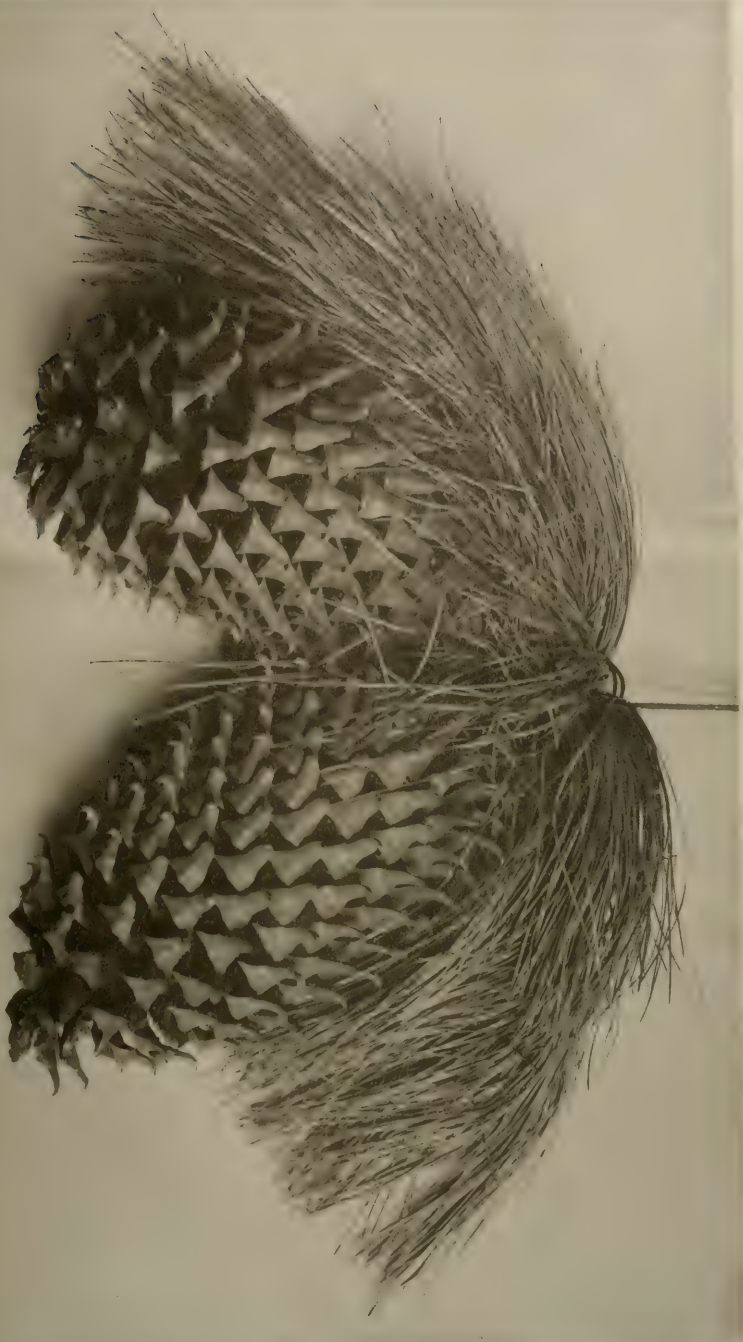
Variety (b) *levigata*—Nearly Smooth-Cone Pine: Cone smaller, and shorter than the typical, and scarcely tubercled. Outlying trees of the Monterey forest, farthest from the sea.

No. 17. *Pinus tuberculata*, Gordon.—Knob-Cone Pine, Sun-loving Pine.

Usually small, early-bearing, crowded, slender trees, rarely found on dry, sunny slopes of the inner Coast Range and the western and northern hills of the Sierra, where it often attains the height of 40-80 feet with a diameter of 2-3 feet. Yearling cones reddish, $\frac{3}{4}$ of an inch long, elliptical, with short appressed scales. Mature cones long-conical, pointed 3-7 inches long (shorter and with shorter tubercles in the Shasta region), leather-brown at maturity becoming gray with age, spreading or strongly declined, usually in full verticils, but little removed from each other and persistent on the stems and branches from bottom to top until the destruction of the tree by fire, when the cone-scales open with a loud report, setting free the long-pent transparent-winged seeds, to be carried away by the wind and, perhaps, reforest the region.



No. 13—*Pinus Coulteri*, Don. Big-Cone Pine, San Bernardino Mts., near San Bernardino; altitude, 1,900 feet.



PAIR OF "BIG CONES" (*Pinus Coulteri*), WITH FOLIAGE.
Weight of both, dry and without seeds, 14 pounds; length of each, 20 inches.



The Knob-Cone is often found so small, even when mature (perfecting fruit at 2-3 feet in height) as to receive the name of "Scrub-Pine," but that name is better applied to a tree which is always small and so in this publication used for *P. contorta*.

No. 18. *Pinus muricata*, Don.—Prickle-Cone Pine, Swamp Pine.

Small, slender trees, rare, in few swampy localities of the outer Coast Range from San Luis Obispo and Point Pinos to Cape Mendocino. Leaves in pairs, but unlike most other binate leaves, very long, 3-6 inches. Yearling cones globular, $\frac{1}{2}$ inch long, with pointed, spreading scales. Mature cones nearly sessile, spreading or recurved, in verticils or clusters of 2-5, often of 6-7, ovate, and slightly gibbous, tubercles longest on the basal, upper side, conical, long, incurved, $\frac{1}{4}$ - $\frac{1}{2}$ inch long, all sharp and persistent. Seeds very small, black, with delicate wings. Timber under some conditions said to be hard and tough. The cones have been known to persist 20-30 years and then release good seeds. (See extended description for remarks upon its vernacular names.)

The remaining Pacific Slope pine—*P. Chihuahuana*, Engel.—is a small tree of Arizona, and southward in the northern States of Mexico, having a crooked, decrepit appearance, thick, brown bark, small top-shaped cones, which are nearly smooth and somewhat persistent; the short leaves in threes.

The affinities of this pine are Mexican, and it may not be included in any of the California groups as limited foregoing.

BEHAVIOR OF CALIFORNIA PINES.

The Long-Cone, Lumber Pines

Are embodiments of magnificence, aristocracy, and excellence. Usually large, lofty, and grand, they are also sequestered in choice locations of middle altitudes, admitting to neighborship, but not fellowship, individuals of all sorts, patricians or plebians, but always carrying their aristocratic heads a little higher and holding out their long sugar-loaf rolls of resin-embalmed seeds far above the heads of the smaller, shorter-fruited species.

Trees yielding abundance of unexcelled material alike to pioneer shakemaker and subsequent lumber manufacturer who but levels these noble giants to earth to procure a rich endowment.

The Dwarf-Cone, Alpine Pines

Are illustrations of the daring, aspiring cliff-climbing element in the Pine family. As the beach pines, *Torrey* and *Monterey*, creep or battle their way down to the foam-flecked shore of the sea despite ocean winds or drifting sands, so these short-coned species climb up to, and cling upon the bare steep rocks of alpine peaks, thrusting their flexile stems under the very snouts of glaciers or pressing with might and main through high passes though beaten prostrate the while by wind, torrent, or ice.

The Oblong-Cone, Plume Pines

Are especial representatives of the esthetic, the beautiful, the graceful, in the Pine family. Selecting sequestered, lofty, scarcely-known country seats near the crowned monarchs of the Sierra, embowered by kindred Pine, Spruce, and Fir, they pose on the steep inclines like colossal figures on Nature's easel—exquisite specimens of modern tree-culture, dressed out with emerald garments, waving plumes, and delicate drapery, abounding

in the double-curve, Hogarth line of grace and beauty and but half-concealing their beautiful, royal-purple-hued pendent cones.

The Globe-Cone, Nut Pines

Represent the provident, liberal, yet economical element in the Pine family. Generally found on low hills or sunny, undulating plains, they spread out their strong limbs, heavily laden, in easy reach of the aborigine; the cones being unarmed, few-scaled, and containing comparatively the largest, most delicious, and nutritious seeds of any other trees of the family.

The Thimble-Cone, Thin-bark Pines

Are the plebeian, unobtrusive, impoverished unfortunates of the Pine family. With attenuated, thin-barked trunks attacked at all stages by parasites and other enemies, both vegetable and animal; their bleeding bodies, and often bare, gnarled, and twisting limbs excite commiseration, which, however, is dispelled in the presence of a heroic individual that has turned the tables on his enemies, or succeeded in resisting their attacks, and so presents a full, crowned head of robust foliage.

The Broken-Cone, Lumber Pines

Comprise the profuse, cosmopolitan utilitarians of the family of Pines. With forms innumerable and individuals widely distributed, they have developed the most adaptable and useful qualities, both in behalf of mother nature, in clothing with forests large sections of country, and of man in furnishing most valuable and procurable lumber and fuel-producing factors of civilization.

The Intermediate Lone Pine

Is perhaps a vestige of a once vast forest occupying a region now mostly submerged; or these singular trees may be precursors of a coming, aggressive, conquering species destined to reforest the southern coast hills.

The Heavy, Spine-Cone, Long-Limbed Pines

Present the ponderous, massive, and coarse, also the protecting and defending principles in the multifarious Pine family. Inhabiting hot, scorched regions, contending there with dwarfed oaks and chaparral, these trees are never slim and feeble, but rather broadened out and freely branching, ever holding aloft their enormous clusters of fruit. What end is subserved by the exceeding massiveness and the formidable armament of their cones? That it is a special adaptation of conditions to environment, of armament to the needs of battle, we may be sure. Doubtless a thick, strong, hard investment of capillary scales defends the ovules from intense heat better than a light one would protect them. Then, too (for there's no end of speculations in this direction), it may be these scales are a defense against the attacks of insects that infest and render abortive the seed crops of other soft-scaled pines and the spruces. And the enormous hooks of their cones, do they not defend against the attacks of nut-hunting squirrels, which else might abridge the dissemination, if not compass the extinction of the race?

The Closed-Cone, Slender Pines

Are the aggressive, conservative, self-sacrificing but surely propagating group of the wonderful Pine family. They are strategical warriors from

away back. Obstreperous and tenacious, they intrude upon coveted ground and multiply upon it so numerously that they starve out all other trees and are obliged to stand close together, crowding and fighting, content to be squeezed to slim saplings if only they succeed in lifting but a scant spire of foliage to the sunlight and the wind-gust, in order to elaborate sap enough to bring to perfection their many belts of suspended, curious, wooden, sculptured seed-caskets of long-preserved life-germs, to reforest the region upon occasion.

CALIFORNIA PINES.

EXTENDED DESCRIPTIONS.

CLASS I. SMOOTH-CONED, WHITE PINES.

(SUB-GENUS STROBUS of Botanists.)

Cone-scales smooth, devoid of protuberances, prickles, or hooks; wood usually lighter colored, softer, and less resinous than that of the other class. (Exception: Our Sugar Pine is often very resinous.)

Cone, sub-terminal, mostly long-peduncled and falling at maturity; scales, usually numerous and flat; leaves, short, 2-3 inches long, in fascicles of fives each, with short, loose, deciduous sheaths at the base. Male flowers oval, small, $\frac{1}{4}$ - $\frac{1}{2}$ inch long.

Five species on the Pacific Slope, four of them in California, arranged in two groups of a pair each.

LONG-CONE PINES.

GROUP 1. LONG-CONE, LUMBER PINES.

Cone long, cylindrical, 8-20 inches long, and 1-3 inches thick, many-scaled, long-peduncled, becoming pendent. Principal spirals, 8 inclining to the left, 13 to the right. Seeds large, dark, with long, brown, persistent wing. Trees usually very large, with finely-checked bark, large and long upper, bearing limbs and light-green foliage. Timber of the utmost value for lumber.

MOUNTAIN PINE.

No. 1. *Pinus monticola*, Douglas.—Mountain Pine, Finger-Cone Pine.

Compared with the other the MOUNTAIN PINE (here called also the FINGER-CONE PINE) is always found at higher elevations and is much less lofty and extended than the great sugar pine. Like the other species it is greatly given to variation. Trees are found with deeply furrowed, reddish or even dark bark, and long purple cones nearly a foot in length. All grades of condition connect to small spindling trees of higher altitudes, with smooth, silver-white bark, and diminutive cones, like ladies' fingers. The timber, but rarely cut for lumber as yet, on account of inaccessibility, is of marvelous purity and beauty. Clear white, with but little resin, and considerable toughness, it makes good finishing lumber, and works well for walls and ceilings.

When occupying clear spaces the trees may retain their body limbs to full age, and also grow large without much increasing their height. Specimens of Mountain Pine from such a tree—only 120 feet high, but 6½ feet thick and 510 years old—were sent from the vicinity of Webber Lake to the Centennial Exhibition.

Variety, *minima*—LITTLE MOUNTAIN PINE.

On the northern cross-ranges and on the coast mountains grows a dwarf variety of this species that is small and often very slender, with diminutive cones, which further examination may show, entitling the form to rank as a species.

The bark is very thin, smooth, and white. Cones purple until maturity, and but 2 or 3 inches long. Seeds minute. Until more definite information is gained concerning this little, apparently dwarfed *monticola*, it may bear the above varietal name.

GREAT SUGAR PINE.

No. 2. *Pinus Lambertiana*, Douglas.—Sugar Pine, Gigantic Pine.

The GREAT SUGAR PINE is the accepted, the crowned prince of the Pine family. Not only by virtue of its unexcelled dimensions and the magnitude of its cones is it regal, but it is a most kingly monarch in its majestic, lofty bearing, its erect, self-asserting dignity, and its bowed head, obedient to its only master—the powers above. Only the supreme emperor of the whole vegetable world, the immense *Sequoia*, also a denizen of our great Sierra forest, and admitting the Sugar Pine to fellowship, excels in dimensions (every way but in fruit) this noble, dominant tree of the whole length of the Sierra with but one other giant—the stately Douglas spruce, also a near neighbor—that at all approaches it in vast proportions or majestic appearance.

We can well imagine the ecstasy of delight and excuse the mild self-gratulation with which David Douglas, the discoverer of this noble tree, writing from the falls of the Columbia, March 24, 1826, to his friend Dr. Wm. Hooker, of London, inscribes:

“I rejoice to tell you of the discovery of a new species of Pine, the most princely of the genus, perhaps even the grandest specimen of vegetation known.”

After describing its tall stem and its umbrella-like head, its long, outstretched upper limbs, with long cones pendent from the ends, he adds: “Growing trees of this Pine” (he always spells the name of this tree with a capital P), “which have been partially burned by the Indians, produce a substance which they use largely, and which I am almost afraid to say is *sugar*.”

In another letter addressed to Dr. Scouler he writes: “This is unquestionably the most splendid specimen of American vegetation known. What would Dr. Hooker give to dine under its branches? As for Mr. Lambert” (for whom he had named the tree the August preceding), “I hardly think he could eat at all.”

The SUGAR PINE being the crowning discovery of Mr. Douglas—five other of our pines having rewarded his indefatigable search—it is pertinent to give in this connection extracts from his journal describing his adventures in pursuit of this pine; the procuring of the cones of which at the very last, nearly cost him his life.

DOUGLAS' SEARCH FOR THE SUGAR PINE.

August 19, 1825. Mr. Douglas, who had been exploring the upper country of the Columbia, started from his headquarters at Vancouver to proceed southward, ascending the Multnomah towards the mountains at the extreme (south) end of the Willamette Valley.

After a perilous three days' trip he reaches the natives of the region and "finds in their tobacco pouches seeds of a remarkably large size, which they eat as nuts," and which he knew to be pine seeds. He learns that the tree grows on the mountains to the south—that is, down nearly to the present California line.

"No time was to be lost," he writes, "in ascertaining the existence of the tree," which he at once, with only a few imperfect seeds in hand, names *Pinus Lambertiana*, in honor of his friend, Aylmer Bourke Lambert, the distinguished Vice-President of the Linnean Society of England. But sickness and inclement weather, also Indian hostilities, prevented further search southward for that season. However, he explores other regions eastward, discovering two new species of pine, which he names *Pinus nobilis* and *Pinus amabilis* (now well known firs, but then included in the genus of pines), making headquarters for the winter at Fort Vancouver.

During the spring and summer months of the next year, 1826, he makes various extensive journeys, rewarded constantly by important discoveries, for the country was all unknown then.

In February a hunter brings him a cone of his Multnomah pine. It "was 16½ inches long and 10 in circuit," and he was assured that "trees were met with that were 170-220 feet high, and 20-50 feet in circumference."

In June, while at the junction of the Lewis and Clarke Rivers, he planned a long trip southward to the Umpqua River, in search of "the gigantic pine," but could not get off in that direction until October. On the eighteenth Douglas, with a companion, "set off due south through the dominions of the Chief, Center-Nose, and having climbed wearily a high divide, we were cheered by the sight of the broad Umpqua River in the valley far below."

A raft was necessary for crossing it, and in its construction Douglas "grievously blistered his fingers." He is also attacked by a severe pain in the chest, almost disabling him from traveling. He creeps along by the aid of his gun and a staff for a time, and is then assisted to travel by a chance-met hunter, who conducts him to his humble camp, where Douglas "bled himself in the left foot, drank a little tea, and soon felt better."

October twenty-third they reach the headwaters of the Umpqua, guided by the son of old Center-Nose, and still "intent upon finding the Grand Pine so frequently mentioned in my journal."

October twenty-fifth.—"Last night was one of the most dreadful I ever experienced. Rain fell in torrents, accompanied by high wind that rendered it impossible to keep a fire burning. The tent was soon blown down about my ears, so that I was forced to lie until daylight in wet blankets, with only *Pteris aquilina* for a bed.

"Sleep was impossible. Every few minutes trees on all sides of the camp came down with a crash, while the flashes of forked lightning and the peals of thunder gave me such terror as had never filled my mind before. Even my poor tired horses were unable to endure the hardships without craving protection, which they did by cowering close to my side, hanging their heads over me, and neighing wildly."

At daylight he "rubbed himself before a fire to restore vitality," and when he had become nearly restored he "was suddenly seized with intense pains in the head and stomach, accompanied by giddiness and dimness of sight," all of which he strove to relieve "by throwing myself into a perspiration by violent exercise."

Early in the morning of the same day (October twenty-fifth) Douglas quitted camp, and "after an hour's walk met an Indian, who, on perceiving me, instantly strung his bow, then slung his raccoon skin of arrows upon his left arm, and stood on the defensive. Being quite sure that he was not hostile, but prompted by fear only, I laid my gun at my feet and beckoned him to approach me, which he did slowly and with many precautions. I then made him place his bow and quiver beside my gun, and, striking a light, gave him a smoke out of my pipe. Then with pencil and paper I drew a rough sketch of the cone and tree which I desired to find, and exhibited the sketch to him, when he quickly pointed towards the hills, fifteen or twenty miles distant, and southward."

Hastening on, at midday Douglas "reached the locality of my long-wished-for pines, and lost no time in examining them, and endeavoring to collect twigs, specimens, and seeds.

"New and strange things," Douglas pauses here to remark, sententiously, "seldom fail to make strong impressions, and are, therefore, often faulty or overrated; so, lest I should never again see my friends in England, to inform them verbally of this most beautiful and grand tree, I shall here state the dimensions of the largest found among several that had been felled by the wind.

"At three feet from the ground its circuit was fifty-seven feet nine inches (that is, nearly nineteen feet in diameter). At one hundred and thirty-four feet it was seventeen feet five inches. Extreme length, two hundred and forty-five feet. The trunks are uncommonly straight, the bark smooth, the tallest stems unbranched for two thirds of their height, the branches outreaching or pendulous, with long cones hanging from the points like sugar loaves in a grocer shop.

"The cones are borne only by the largest trees, high suspended in air, and the putting myself into possession of three of them, all I could procure, nearly brought my life to a close.

"As it was impossible either to climb the trees or to hew one down I resorted to knocking them off by firing at them with ball. The report of my gun almost instantly brought into view eight Indians, all armed with bows, bone-tipped spears, and flint knives. I endeavored to explain to them what I was doing there and what I wanted, and they seemed satisfied, sitting down to smoke with me; but presently I perceived one of them to string his bow, and another to whet his knife with a pair of wooden pincers. Further testimony of their intention was unnecessary.

"To save myself by flight was impossible, so without hesitation I sprang backwards about five paces, cocked my gun, drew one of the pistols from my belt, and showed myself determined to fight for my life.

"As much as possible I endeavored to preserve coolness, and thus we stood facing each other without the slightest movement or uttering a word for full ten minutes. At last the leader dropped his hand and made signs for tobacco and pipe. I signified that they should have a smoke if they would fetch me a quantity of cones. They went off immediately, and no sooner were they out of sight," says Douglas, "than I picked up my precious cones and made the quickest possible retreat."

Poor Douglas never saw his "Grand Pine" again, and upon his second tour of western exploration the next season, after visiting Monterey Bay

and vicinity, where he discovers *Pinus insignis* and *P. Sabiniana*, he sailed for the Hawaiian Islands, and while exploring there he fell into a pit prepared for capturing wild cattle, and was trampled to death by an entrapped steer.

Description.

The GREAT SUGAR PINE excels in evenness and straightness of grain, hence making excellent timber for riving into shakes or shingles, and this quality has led already to the shameful destruction of thousands of noble trees on Government land. Lawless vagabonds penetrate the Sierra forests, with only the equipment of an ax and a long saw, and leveling these monstrous trees they saw out a cut, examine it, and, perchance, move on to the destruction of others, leaving to rot on the ground trees that would yield to the careful lumberman twenty thousand to fifty thousand feet of clear lumber worth hundreds of dollars.

A peculiarity of this pair of trees is the specialized, long upper limbs and the short lower ones, which soon decay and fall; thus the trees, self-trimmed while yet small, swell out their matchless trunks with smooth bolls reaching up to the great limbs, affording the longest clear-cut lengths for saw logs of any tree known. I sent to the Philadelphia Centennial Exhibition, in 1876, specimens from a tree in Sierra Valley, Sierra County, that was one hundred and seventy-five feet high, seven feet in diameter, and five hundred and eighty-eight years old. It was estimated to yield seventy thousand feet of clear lumber. Trees are met with in the sugar pine regions of the Southern Sierra that rival in dimensions the twenty-foot tree described by Douglas.

As stated, this pair of species are never found forming a grove of even small size exclusively; they always mingle with others, or what may be a more consecutive statement of the truth, they freely admit other trees of all sorts and conditions to neighborhood. But whatever the company they keep, only these monsters, the sugar pines, rising like columns of light in the forest, are companions of each other.

The SUGAR PINE varies greatly with altitude and exposure, also there may be a radical difference in the source, the origin of certain forms, which careful study of numerous subjects may yet detect. Oddly enough, trees in contiguous forests will exhibit often wide differences in various ways; the yearling and immature cones of the second season will be deep purple on one collection of trees, these usually on higher locations; and yellowish with shorter cones than other larger trees below bearing longer, apple-green cones.

Variety, *minor*—LITTLE SUGAR PINE.

Trees and fruit, small; bark, thin and whitish, often quite smooth and unchecked. Found rarely on the northern cross-ranges and in the coast mountains. Until further studied it may bear the above name.

ALPINE PINES.

GROUP 2. DWARF-CONE, ALPINE PINES.

Dwarfed, often depressed trees, forming the upper fringe of alpine forests in the Sierra and northward. Cones, sub-cylindrical or ovate, shorter, with fewer scales, 2-6 inches long; seeds, large, nearly wingless; bark, thinner and whiter than the first group.

GROUP 2. SHORT-CONED, ALPINE PINES.

No. 3. *Pinus flexilis*, James.—Limber-Twig Pine, Western White Pine.

No. 4. *Pinus albicaulis*, Engel.—White-Bark Pine, Creeping Pine.

As the beach pines—Torrey pine and the Monterey pine—resist the storms of ocean and hold to the loose drifting sand of the coast, even creeping down to the very foam of the sea, so the alpine members of this family, the LIMBER-TWIG PINE and the WHITE-BARKED PINE, climb up to and cling stoutly to the bare, bold rocks of the alpine peaks, and thrust their flexile stems under the very snout of the glaciers, or they grope resolutely, though prostrated by torrents and gales, along the glacier-smoothed passes of the Sierra.

Here is a most marked example of the adaptation of subject to environment. None but a flexible nature could do battle victoriously against such odds. How long before the brittle stems and long leaves of the foothill pines would be snapped and scattered over the mountain side where these crouching supple-stemmed species battle and annually celebrate their victory by the production and dissemination of a proportionately larger amount of seed than do other species of the mild, soft, enervating lowlands.

These alpine species, though differing in minor details of fruit and stem, closely resemble each other, as might be expected when comrades, brothers of the same family, are compelled to face and fight similar dangers.

It will be noticed, first, that the fruit of the alpine is shorter and much smaller than that of their nearest kindred before described. This is but adaptation of condition to needs.

A small, nearly globular cone 2-3 inches long, set closely upon its short, thick stem, can tide out a storm better than a cone of 20 inches hung out on a long, swaying limb.

Secondly, the timber of the Alpines is exceedingly tough. I doubt if a species of other groups will discover a tithe of the toughness that these trees possess if they could be sufficiently examined. Naturally, their locality away up to the timber line almost precludes the possibility, at least the ready probability, that characteristic specimens have ever been tested for strength. I know the subalpine PLUME PINES are credited with exceeding toughness, and, no doubt, proper tests of them have been made. But the fact of the superiority of the endurance of the ALPINE PINES may be postulated upon the bare proposition that they *need* to be tough—and so they *are* tough.

I have had frequent occasions to test the strength of the limbs of these species by seizing them, never without safety, in enabling me to pull myself up a precipice by their overhanging boughs.

About the peaks of the alps back of Yosemite, I have often had occasion to notice the strength, the slowness of growth, and the extreme age of very small specimens of these trees. Tourists in these heights have tied the young shoots into knots years ago, yet the trees are thriving.

John Muir says of *P. flexilis*: "A certain tree that was 3½ inches in diameter and hardly 3 feet high, when cut half way through, revealed no less than 250 rings. Another similar one was 420 years old; one of its small branchlets, hardly half an inch thick, displayed 75 rings, and was so filled with balsam and so seasoned in storms that we may tie it in knots like whipcords."

But few have enjoyed what it was the writer's privilege to experience while exploring the upper heights of Yosemite. I climbed Anderson's rope



No. 10.—*Pinus Murrayana*, Balf.—Tamarack Pine, Donner Lake, near Truckee.
Alt. 5,800 feet.



(now both the rope and its intrepid maker in dust) to the top of South Half-Dome.

Exploring its crown we found an ellipse of table rock about one hundred rods long, with but one tree maintaining its hold, as by an eagle's talons, to the wind-swept rock, two miles in vertical height above the sea. Of course it was the LIMBER-TWIG PINE, over two feet thick at base, but only a few in height, with willowy branches that receded and swayed, self-protectingly, with every breeze.

Comparing this pair of species with their well-known and gigantic twin brothers, the contrast is of the widest degree. The GREAT SUGAR PINE and the MOUNTAIN PINE are the tallest of the family; these alpines often spread their platforms of foliage but a few feet above the rocks; those with long, out-reaching limbs, with half-yard long pendent cones in playful dalliance, these with contracted, flexuous branches conformed to the furrowed rocks, while nestling close to their leafy couches the diminished, but precious progeny of cone and seed; those furnishing their seeds with long wings to carry them sailing on the wind to distant localities, these stripping their seeds of such destructive organs and sending the plump, pale seeds to drop at once into a favorable rock cleft.

Comparing them one with the other, the LIMBER-TWIG is often found with a considerable show of trunk and length of limb, the others never but little of each; the first, with limber branches, avoids injury from attacking objects by gracefully yielding the path, the WHITE BARK resists encroachment with sturdy, short thick branchlets.

The flowers of these pines are exceptionally pretty, being large spikes of rose-red stamens, set off with tufts of the short leaves beneath them. The seeds of the WHITE-BARK PINE are the favorite food of Clark's crow, and for several seasons scarce an uninjured cone or a ripe seed have I been able to procure by reason of the previous visitation of this pine crow to the Shasta timber-line trees.

A curious formation in the male flowers of this last species I should record in this connection, as it may foreshadow a line of development that will bear investigation and prove of interest. On a tree of the WHITE-BARK PINE, growing near the trail and about one half mile below Horse Camp, at the timber line of Shasta, was detected in September, 1888, a great many beautiful reddish flowers in short spikes. On close examination each spike of stamens was noticed to be forked near the base, the separated parts continuing to the end about one half inch.

Among scores of blossoms examined not an exception was detected, and I have thought it best to preserve several specimens between two slides of thin glass for the benefit of any student who desires to examine the phenomenon.

In this connection it may be stated that the involucre scales of the various male flowers of our species, as also bits of seed-wings and cross-sections of leaves, have all been prepared and placed under thin glass slides for microscopic examination.

CLASS II.—ROUGH-CONED, PITCH PINES.

(SUB-GENUS PINASTER of Botanists.)

Cone-scales rough, armed with conspicuous protuberances, prickles, or hooks. Wood usually darker, harder, more resinous than that of the first class.

Eighteen species on the Pacific Slope, thirteen in California, in two sections of two groups each; and an intermediate solitary species.

SECTION A. SUB-TERMINAL, MOSTLY DECIDUOUS-CONED, HARD PINES.

Cones arising near the terminal leaf-bud, and at maturity separating from the stem either below or just within the base.

Eleven species on the Pacific Slope, eight in California, in two very unequal groups.

GROUP 3. ENTIRE-CONE, CLOSE-GRAINED PINES.

Cone small, remaining whole at maturity, separating regularly from the peduncle. Leaves short. Male flowers very small.

Three distinct pairs of species.

PLUME PINES.

FIRST PAIR. OBLONG-CONE, PLUME PINES.

Cones oblong-cylindrical, 3-5 inches long, $\frac{1}{2}$ - $1\frac{1}{2}$ thick, pendent from the ends of the long branchlets; scales numerous, and nearly flat; leaves mostly in fives, persisting for many years, 10-20, very short and appressed to the branchlets—whence the resemblance to plumes—sheaths loose, deciduous.

Sub-alpine, spire-shaped trees of the Rocky Mountains, with a few groves in the high Sierra. Wood reddish, cross-grained, and exceedingly tough. Bark reddish brown, deeply fissured.

The sub-alpine Plume Pines are very interesting trees, at first sight seeming not to be pines at all, but spruces from the similitude of their close-clothed limbs and small, depending cones. They are so high in the alpine forests that only the hunter or explorer is apt to know of them, and hence, perhaps, some errors have crept into former descriptions.

Both are usually found in loose, volcanic or moraine soil, on steep inclines.

FOX-TAIL PINE.

No. 5. *Pinus Balfouriana*, Jeffrey.—Fox-tail Pine, Spruce Pine.

This singular spruce-like pine exhibits an instance of extremely limited and local development. As shown by the "Descriptive List," it is only found in a few groves of the alpine Sierra, from Scott Mountains to the headwaters of Kern River. The Scott Mountain locality was discovered in 1852, by that sharp-eyed Scotch gardener, John Jeffrey, representing Edinburgh florists, and sent out to explore more thoroughly the new forest of rare trees, of which Douglas had reaped such a rich harvest.

Jeffrey noted his discovery "Mountains between Shasta and Scott Valley, N. Cal. Lat. $40^{\circ} 30'$ to $41^{\circ} 50'$. Elevation 5,000 to 8,000 feet. Trees, 80 feet high by 3 in diameter." All of which, with his minute description, was published by the "Oregon Committee," from which I have taken the above items, derived from a rare copy in possession of Dr. Parry. But so small are the groves, and so local their position, they were not detected anew until August of 1878, when the writer, making his headquarters at Sisson, prosecuted a thorough search of the various intricate mountain ranges lying west of Shasta, and forming spurs of the diversified Scott

Mountains. I noted the locality for publication in "Brewer's Botany of California," as "on the southern flanks of the Scott range of mountains, forming a dark-green belt, from 5,000 to 8,000 feet altitude, between the light-colored *P. monticola* below and *P. albicaulis* above it." Mr. Sisson has since guided Professor Sargent, Dr. Engelmann, Dr. Gray, and Sir Joseph Hooker to the locality, for the purpose of their studying this curious tree.

In "Botany of California" the description occurs "*apophyses*" (that is, the exposed portion of the cone-scales) "thick with short deciduous prickles;" but I find the part of the cone-scale described is thin, the little recurved prickle standing in a depression and by no means "deciduous," but firmly persistent.

BRISTLE-CONE PINE.

No. 6. *Pinus aristata*, Engelm.—Bristle-Cone Pine, Hickory Pine.

This beautiful tree, also a lover of alpine heights, though somewhat common on the highest peaks of the Rockies and the mountains of Arizona, is quite local in California. I have only detected it in the high Sierra back of Yosemite, and upon Mount Agassiz of Northern Arizona at an elevation of about ten thousand feet.

John Muir writes of the bristle-cone pine: "Grows on the headwaters of the Middle Fork of Kings River, how much further north I cannot say, but certainly it extends southward to the extremity of the range. It reaches its highest development at elevations of about ten thousand feet in sheltered valleys, or coarsely ground moraines or fissured table lands, and runs up to the limit of tree life on the summit. It combines gracefulness of habit with strength and flexibility in a marvelous manner. It is certainly the most variably graceful of all the Sierra pines."

VARIETY OR SPECIES, WHICH?

The BRISTLE-CONE PINE when first discovered was given specific rank by Dr. Engelmann and so classified for some time, but other discoveries, subsequent, led the doctor to regard it as but a variety of *Balfouriana*. They differ mainly upon characters of the fruit (see description of both species in Descriptive List). I have not hesitated to give *aristata* specific rank not only upon the distinctions noted, but for other considerations. It seems to me absurd, that because Jeffrey discovered near Shasta a little, outlying grove of peculiar trees, in 1852, several years before other botanists discovered many other forests of somewhat similar trees, widely distributed over the mountains of Colorado, Utah, New Mexico, Arizona, and the southern Sierra, that, *therefore*, his little grove should be regarded as the type of a species and all the rest added to it—the first instance we have to deal with of adding a many-roomed house to a single-roomed annex.

GLOBE CONE PINES.

SECOND PAIR. GLOBE-CONE, NUT PINES.

Cones sub-globose, $1\frac{1}{2}$ –2 inches long, scales few, very protuberant and unarmed, widely opened at maturity. Seeds very large, wingless, and edible. Favorite Indian food. Leaves heavy-scented, with deciduous sheaths.

SINGLE-LEAF PINE.

No. 7. *Pinus monophylla*, Torr. & Frem.—*Single Leaf, Fremont's Nut Pine.*

This curious little SINGLE-LEAF PINE has been met with in several places on the eastern and southern slopes of the Sierra. Perhaps its headquarters of greatest development are in the Tehachapi Mountains, where Fremont detected it again in March, 1845, having first discovered it the season before near the site of the present city of Carson, as he was about to find a pass through the Sierra near Lake Tahoe. Fremont noticed this pine with great care for some three hundred miles along his course on both sides of the Sierra. He noticed its resistance to cold, and recorded the fact that in its highest locality the trees were covered four feet with snow, and the mercury stood at -2 degrees. Fremont called it "one-leaved pine;" Endlicher changed it in honor of the discoverer to *P. Fremontiana*, and the tree has ever since bore both of these names interchangeably; but the better name is *P. monophylla*, since it is the only single-leaf pine known.

The trees in open situations, as upon the low hills near Carson, Nevada, become round headed, freely branching from the base, but in the gulches of the Sierra they are spire-shaped, or even tall and slim. Trees in the Tehachapi Mountains were noted in June last four feet in diameter and nearly one hundred feet high.

But the trees of the Sierra are generally decrepit and much broken by winter storms. In sheltered situations beautiful trees are seen of pyramidal outline, often heavily fruited, so heavy that their limbs are bowed to the ground. The cones are usually quickly deciduous. A fine forest of SINGLE-LEAF PINE is found on the San Bernardino Mountains, near Bear Valley, of the same character and condition of bearing as in Tehachapi. Male flowers, June fifteenth, were just disseminating their pollen. Formerly the nuts of this pine were collected in great quantities annually by the Washoe tribe of Indians, for food.

At the harvest time, nearly the whole tribe, men, women, and children, with their ponies, would proceed to the groves of trees and camp by them. With long poles the cones were beaten off by the men, the boys climbing such trees as admitted of it, to secure the fruit, which was taken by the squaws, piled in heaps with leaves and earth thrown over them, and then set on fire.

When roasted several hours the cones will be found opening and discharging the large and truly delicious kernels.

ARE THE LEAVES REALLY SINGLE?

There has been much discussion ever since the discovery of this tree upon the characters of its leaf, and eminent authorities have held opposing views; some declaring that the leaves were truly single and solitary, others that the terete foliage was due to the firm agglutination of a pair of leaves.

Sir Joseph D. Hooker adopted the connate theory, and says:

"The anomaly of the single-leaf is due to the cohesion of the two semiterete leaves of each sheath, and is far from being a constant character. In the plants at Kew," he adds, "the two leaves are as often free as united, and on making a transverse section it will be seen that the vascular bundle in the center of the cylinder is, in fact, double, and that the two parts are sometimes separate."

Maxwell F. Masters, editor of the "Gardener's Chronicle," London, in "Annals of Botany," Vol. II, No. 5 (kindly loaned me by Professor

Greene), discusses the phenomenon very plainly, and, as he arrives at a different conclusion from the above eminent authority, it will be of interest to present his statements briefly in this paper. After stating that "the axial or ramial nature of the typical pine needle is now pretty generally discredited," he writes:

"In the hope of reconciling the discrepancies between these statements, or of ascertaining which is the nearest to truth, I have recently repeated some observations first made in 1883, both as to the minute anatomy of the leaves and to their mode of reproduction." Then follows a detailed description of the microscopic organs seen in a cross section of a leaf of the *Pinus monophylla*, showing that the structure is in all respects the same as in the leaves of other pines; "hence," he concludes, "the leaf-like body is a *true leaf* which occurs singly usually, but occasionally in pairs, as must have been the case of the leaves examined by Sir Joseph D. Hooker. There is, of course, no difficulty in understanding the latter condition; the anomaly consists in the single cylindrical leaf, to all appearances occupying the apex of a shoot.

"To clear up this anomaly I investigated the development of the constituent parts of the leaf bud at various stages of growth, and, without going into details, I may say that development supplied the clue which neither outward morphology nor internal anatomy sufficed to give. In point of fact, in the earliest stages examined there were always two foliar tubercles, one of which speedily overpassed the other, so that ultimately all traces of the second leaf were obliterated. The monophyllous shaft of this pine," Mr. Masters concludes, "therefore owes its peculiarity to the generally arrested development of one of its two original leaves."

PARRY PINE.

No. 8. *Pinus Parryana*, Engelm.—Parry Pine, Mexican Piñon.

[From the San Diego Bee, March 11, 1888.]

BEAUTIFUL PIÑON PINE.

Pinus Parryana.—A Pilgrimage Undertaken for Its Rediscovery.

"What is the next rarest California pine to be studied?"

"Parry's, of San Diego County."

"But that species runs over into Mexico, does it not?"

"Yes, and we will follow after it."

There are some eighteen species of pine in California, a few of them widely distributed into other regions, but most of them quite local. The most interesting in this respect is Torrey's pine, limited to a few hundred trees at Del Mar, which we studied a fortnight ago.

The next rarest species is the piñon or nut pine of San Diego County, named botanically *Pinus Parryana*, in honor of the veteran botanist, Dr. C. C. Parry, who first discovered it during the survey for the Mexican boundary in 1848. The species is sparsely found on the Cuyamaca Mountains in San Diego County, but extends along the highest points of the vertebræ of Lower California.

On the San Rafael group, some sixty miles east of Ensenada and at an elevation of five thousand feet, it is said to be found in its best state.

As we wished to study it under all conditions of environment, we resolved (my husband and I), to first visit its apparent headquarters. All roads

lead to Rome, and most Mexican outlets are by way of the brave, battling border town of San Diego.

On May Day morning we found ourselves smoothly gliding into the famous Todos Santos Bay, past the little islet that helps to break the force of the Pacific when it belies its name, and soon making fast to the long wharf leading to the town of over one thousand five hundred inhabitants, grown from a few Mexican haciendas in a few months, the impetus given to settlement, consequent upon the concession of the upper and best portion of the peninsula, by the Mexican Government, to the International Company of English and American capitalists.

Expressing our desire to a representative of the International Company, an appreciation of the importance of our work brought ready response; but we must not be sent off to the woods that day. No, no. One day must be given to Ensenada and its people.

Next morning a noble span of sorrels, a strong light wagon, with a skillful driver, were placed at our disposal, our camping outfit of tent, blankets, and food supplies were brought out from the Custom House, to which were added our photographic apparatus and botanical equipments, and away we sped for the mountains at a rate surprising to the occupants of the Mexican capital.

Six miles of meandering through a narrow valley, frequently crossing a stream of pure, cool mountain water, shaded by large evergreen oaks, rising successively over mountain spurs, brought our vehicle to the top of the first summit, where, turning our gaze westward, the broad valley, the shimmering bay, the cosy town, and the fringing islet on the horizon, form a most pleasing panorama. Eastward alps on alps rose before the vision, as if to debar further progress, but onward passes the well traveled road, and we pursue, while the valley broadens in places to parks of oak, rich meadows, and most favorable locations for orchards and vineyards. From the first the way was bordered with plants, flowers, and ferns of vigorous growth and lovely appearance. Many were strangers, and awoke covetous desire, but the most were common to the bordering northern regions, though always more robust, the colors of deeper, darker tints. The noon halt was made in a very paradise of beauty; broad-crowned oaks shielded the sunlight, hung with festoons of clematis, through which gleamed vistas of meadow, waterfall, flower carpeted slopes, and bars of tropic sheen. In a twinkling the coffee and eatables are prepared, the former being boiled on an improvised stove made from an oil can, prepared by cutting out both ends and kindling a fire within—a most convenient, cleanly, and expeditious stove, recommended for campers' uses and tested by the writer for the past eight years during extensive explorations.

Seven miles further of more rugged and rocky highway along Los Cruces Valley, bright with parterres of lilies, and revealing moist rock clefts, caulked with rare ferns, and we ascend the last hill and look over into the wonderful San Rafael Valley, twenty miles long and ten miles wide, through the center a river, its winding course indicated by cottonwoods, with frequent lagoons and tule meadows proving the abundance of water. The floor of the valley is a checkerboard of grain fields, squares of freshly plowed grounds, bosses of green shrubbery and alfileria patches, while beyond, a thousand feet higher, rose the delectable San Rafael Mountains, showing at this distance a fringe of pine peeping over their passes, a sight that gladdens our botanic souls and sends us into the little Mexican town of Real del Castillo with happy hearts to pass the night.

With the morning light our spirited sorrels again whirled us out of the sleepy town and across the valley to the foothills. Little had we inquired

or been told what the lofty San Rafael Mountains had in store for us, and our surprise was most genuine when we began winding up through tree-lined ravines that broadened into wide valleys and parks of noble pines that vie with those of the California Sierras, both in beauty and value. Trees were noted four to six feet in diameter, and thirty to fifty feet to the first limbs.

For fifteen miles we glided along amidst the forest over a smooth, hard road of comminuted white sand rock, affording extensive meadows of grass and clover, which but sparsely showed the presence of cattle and horses.

The pines, while most interesting of themselves, and most unexpected, were nevertheless familiar, being the black pitch pine, or botanically, *Pinus Jeffreyi*, variety *peninsularis*, of California, the typical form being very abundant in the forests of the high Sierras, where it is manufactured into lumber. It is to be hoped that this San Rafael forest, so rich and valuable, may be protected from the waste and wanton destruction that marks the progress of the northern timber-cutter.

But we were searching for the little, rare piñon pine, belonging to a group that inhabit only rocky peaks, and the sun had nearly set before the first trees were detected, near Hanson's ranch and the large lagoon beyond it. Pitching our tent in the shelter of a bold rock, we prepare supper and retire early to recuperate strength for the morrow's work. With the first rays of sunlight certain characteristic trees were selected, the camera adjusted, our driver Jesse, with his broad Mexican hat, placed near the trees to exhibit comparative height, and a series of plates exposed. Supplementing these we secured specimens of twigs with their infant cones for pressing in our botanic portfolio, and a quantity of cones with a section of timber exhibiting rings of growth, bark, etc.

The Parry pine—called by the natives piñon—is always a small tree, usually less than thirty-five feet high, with a rounded, close head of slender limbs bearing cones, which at maturity, two years, open widely, discharging the few large, sweet, delicious nuts, then falling to the ground.

Returning to Ensenada we found all its inhabitants gathered on one of the plazas, celebrating the fifth of May victory of the Mexicans over the French, signalized by the execution of Maximilian. Under a canopy were Governor Torres and his staff, representatives of the International Company, etc., while the troops of the capital were out in force; floats, transparencies, and other representations of the varied interests of the place, while from every house and office floated the tricolor—green, white, and red—of the Mexican Republic. Too wearied to participate, we hurried aboard the steamer bound for San Diego.

In concluding this brief sketch the writer has to acknowledge that from first to last on our trip we were greatly disappointed in our observations and experience, and agreeably so. A voyage along the coast years ago, revealed sandy shores and apparently barren hills. Certain travelers had reported derogatively in regard to the territory within, and we remember that a few years ago the project was mooted by our Government to buy the peninsula and use it as a penal colony. But the old Mission Fathers were right in christening it more than one hundred years ago, "Tierra Perfecta"—the perfect land. And only recently, a botanist, the veteran explorer of the southwest, Dr. C. C. Parry, has told us the exact truth and cast the horoscope of the future for Lower California. "Why, don't you see," he exclaimed, with enthusiastic utterance, "that long, narrow peninsula enjoys an insular, mild, equable climate, at just the right latitude, with such diversities of altitude and abundance of water as to amply fit it for what it

is—the loveliest of floral regions—and it will become, when better known, the sanitarium of America, if not of the world.”

Mrs. J. G. LEMMON.

THIN-BARK PINES.

THIRD PAIR. THIMBLE-CONE, THIN-BARK PINES.

Cone, sub-cylindrical, 1-2½ inches long, strongly declined, falling at maturity or persisting indefinitely. Male flowers, very small; leaves, in pairs; seeds and wings, very small. Trees with exceptionally thin bark, and white, soft wood.

SCRUB PINE.

No. 9. *Pinus contorta*, Douglas.—Scrub Pine, Twisted Pine.

The little SCRUB PINE detected by Douglas on the west coast of Oregon, but afterward found extending southward as far as Cape Mendocino, is nearer to the horn-coned Gray pine of British America than is the other species of this pine, on account of its usually long persistent cones. But little is known of it, as it is too small for use as lumber, and we are so well supplied with beautiful lawn trees that we are thoughtless of others. However, a fine row of them is in cultivation in the Berkeley arboretum, and they evidently take kindly to the somewhat elevated and sandy soil, and by their close-branched, round-headed form and dense dark-green foliage they prove themselves worthy of trial as wind shelters or ornamental lawn trees, where small, slow-growing trees are desired.

TAMARACK PINE.

No. 10. *Pinus Murrayana*, Balfour.—Tamarack Pine, Murray Pine.

Until recently this interesting and widely disseminated sub-alpine tree was considered as only a variety of the small, limited preceding species—another case of attaching a house to a veranda, of subordinating a wide-spread tree to one of extremely local range.

However, of late the differences between them have been judged sufficiently numerous and important to raise the Tamarack Pine to the rank of a species, and the puzzling synonymy and incongruity are both cleared away.

The TAMARACK PINE is found in high, wet valleys of the Sierra, usually occupying the ground to the exclusion of all other trees, but often sharing with *P. monticola*.

When young the bark seems to be the favorite food of the so called sap sucker (*Sphyrapicus varius*, var. *nuchalis* of Baird), the one with a spooned-billed tongue, with which he scoops out the inner bark for food, making rows of holes in close and regular succession, either longitudinally or transversely, often thereby severely wounding and crippling the tree, or killing it outright. From these and other wounds, these trees are apt to be found exuding abundance of resin, which soon hardens to pitch, giving the species another name of “pitch tree.”

Also when young this tree is often attacked by the Western Porcupine, an account of whose ravages is given under the title of “Enemies of Pines.”



No. 14—*Pinus Sabiniana*, DOUGL. Gray-Leaf Pine, near Auburn, Cal.; 180 feet high;
altitude, 2,500 feet.



Still another enemy menaces and often kills the young TAMARACK PINES, this one a member of the vegetable kingdom, to wit: the Pine Mistletoe (*Arceuthobium Americanum*), discussed in another place.

Wherever the tree escapes all enemies which take advantage of its thin bark, as stated, and it attains full stature, it is often a very graceful tree, notably in the forests around Webber and Donner lakes of the Sierra, at altitudes of 4,000 to 7,000 feet, usually occupying the ground to the exclusion of all other trees. In this case it often becomes crowded into groves, and hence the trees are there tall and slim, of great service as fencing material, posts, railroad ties, etc. From the frequency of these tall saplings in the high Sierra and their use in making log cabins and temporary structures of various sorts, the tree has been given the name of "Lodgepole Pine." In certain localities, notably wet regions, near Lassen Peak and Shasta, the Tamarack pines crowd into the company of the beautiful MOUNTAIN PINE, the SILVER SPRUCE, and other sub-alpine trees, and vie with them in display of white-barked trunks and light airy foliage.

In localities where the soil is boggy or rocky, limiting the number of trees, they often grow to an immense size and retain their side limbs through life, becoming more rounded or conical in outline, or often they become bent or twisted into forms more picturesque than beautiful.

A tree of such large size, standing on a moraine near Meadow Lake, in Sierra County, was cut to obtain specimens for the Centennial Exhibition. It was 297 years old, 123 feet high, 7 feet in diameter, with a wealth of 360 body limbs on all sides, many sweeping the ground.

As the trees advance in age occasionally one or more of a grove are found dying or already dead without apparent reason, but as the bark falls away from the branchlets they are seen to be twisted tightly on their branches, and later, these also are revealed as tightly twisted and turning downward before falling. Thus it seems that this tree of all others known, often limits its own life by the twisting of its limbs, so preventing the flow of sap. The turns on limbs of trees, noted near Webber Lake, made a complete revolution every inch. The limbs, cracked in spirals from end to end, resemble the screws for a letter press.

BROKEN-CONE PINES.

GROUP 4. BASE-BROKEN CONE, LUMBER PINES.

Cone breaking away at maturity by a transverse fracture within the base, rendering it thereby truncate (*i. e.*, cut away) at the base, and leaving persistent on the limb its undeveloped basal scales. The cones are ovate-conical, sessile or nearly so, spreading or slightly declined, many-scaled—5 spirals inclining in one direction, 8 the other. Seeds about $\frac{1}{2}$ an inch long, wings transparent, beautifully veined with brown. Leaves in threes, and 5-8 inches long, sheaths long, close-wrapped, and persistent. Male flowers large and long. Bark usually very thick and deeply fissured into large sections.

Trees of the largest dimensions, widest distribution, and of the utmost value for lumber, fuel, etc.

One pair of species, each species with three varieties.

YELLOW PINE.

No. 11. *Pinus ponderosa*, Douglas.—Yellow Pine, Heavy Pine.

BLACK PINE.

No. 12. *Pinus Jeffreyi*, Murray.—Black Pine, Sap-wood Pine.

THEIR FORESTAL IMPORTANCE.

Of the twenty-three species of pine found on the Pacific Division of the United States, eighteen species are of the class called Pitch Pines, or Hard Pines, to distinguish them from the White or Soft Pines, five species of which inhabit the same region.

Chief of the Pitch Pines in many respects—size, quantity, quality, etc.—is the magnificent YELLOW PINE—*Pinus ponderosa*—and its nearest relative, the BLACK PINE—*P. Jeffreyi*—forming the greater part of the noble forests of the Sierra and Rocky Mountains, and consequently they are of the first importance as comprising a great part of the natural wealth of the region. Only their majestic companion in the Sierra, the GREAT SUGAR PINE—*P. Lambertiana*—and the world famous Coast REDWOOD—*Sequoia sempervirens*—and the Oregon RED SPRUCE—*Pseudo-tsuga Douglasii*—can at all compare with these two species in economical or forestal importance.

The Pacific YELLOW PINE and the BLACK PINE are so variable in appearance, qualities, uses, etc., and, moreover, until recently have been so little studied, that an investigation by Special Experts, as lately instituted by the State Board of Forestry, is at once most desirable for the advancement of scientific information, and also most opportune, economically considered, in view of the fact that at the present time, more than during any other period since the discovery of gold in California, thousands of persons are looking to the far West, studying its attractions, resources, etc., while capital is seeking new methods of utilizing its immense natural wealth.

THE DISCOVERERS.

The history of the discovery of these trees, along with others of the great western forests, fills volumes of early exploration. Briefly, David Douglas, a Scotch botanist, exploring the northwest coast of America, under the auspices of the Horticultural Society of London, during his first trip, in 1825, while exploring extensively in Oregon and Washington, was the fortunate first collector of several important species of trees, including this Pacific YELLOW PINE, which, from its heaviness, he named *P. ponderosa*. As discovery advanced into the interior and southward, other forms were met with by other explorers, and as a consequence nearly a dozen different names have been given to forms of this polymorphous species.

It is only recently that the other species under consideration, the BLACK PINE, which had all along been called a variety of the *ponderosa*, was allowed to take rank as a distinct species—*P. Jeffreyi*. This pine was first collected in 1852-3 by John Jeffrey, a Scotch gardener, and was named, as above, in his honor, by Professor Murray.

Descriptions of *ponderosa*, more or less technical and elaborate, have appeared in about fifty standard periodicals, with thirty-three descriptions of it under other names, as *P. Benthamiana*, *P. resinosa*, etc.

The BLACK PINE has been described in the same periodicals about a score of times, and nearly as many times under other names, as *P. deflexa*, and varieties of *ponderosa*.*

SEEKING INFORMATION.

For the prosecution of the investigation at present undertaken, in addition to personal inspection of the forests during twenty years past, reliance has been placed upon the dissemination of a "circular," presenting a brief description of the two species, followed by a double series of questions.

Though not eliciting as many and as full responses as hoped, yet acknowledgment is due for several valuable communications.

William B. Tiffany, of Truckee, California, returned elaborate replies, covering economical and biographical information concerning a most interesting and extensive lumber region of the West. Mr. C. F. Sonne, of the same place, added important statistics from his ample resources as book-keeper of the Truckee Lumber Company. Hon. H. K. Turner, of Sierra Valley, and J. D. Keefer, of Nord, both of Northern California, gave nearly full reports from their regions respectively. J. W. Snodgrass, of La Grand, Union County, Oregon, reported for the extensive forests of his State; and L. C. Seaton, of Teonoway, Kittitass County, Washington, gave a good report from that Territory. (See Special Investigation.)

DISTRIBUTION AND HABITAT.

With the single exception of the DOUGLAS SPRUCE (at the north improperly called "Oregon pine"), which has about the same range, the Pacific YELLOW PINE has much the widest distribution of any other timber tree of the West.

According to Sargent, a very large portion of the Pacific region is given as the home of this ponderous pine, with its headquarters in the Sierra Nevada. His map gives the distribution in a general way over all the ranges of the Sierra and the coast mountains, to their termini in Southern California, and including the great valley of California between them; thence, extending northward to British Columbia. At the north the cross ranges of Oregon and Washington carry the species over to the Rocky and Wasatch Ranges, where it spreads thinly out over a broad belt extending southward to and beyond the Mexican boundary.

The outlying Black Hills of Dakota are correctly shown as also inhabited sparsely by this species.

The great interior basin of Utah and Nevada, between the Rockies and Sierra Nevada, however, is devoid of this species, and so are several other quite large areas, notably the valley of California—erroneously represented on Sargent's map as occupied by this species.

The vast region positively known to comprise the home of the YELLOW PINE includes all of the Sierra Nevada except barren portions of its southern termination, and a much larger middle section of the Rocky Mountains, with the cross ranges connecting at the north, as mentioned, and a scattering growth on the coast ranges.

The other species under consideration—*P. Jeffreyi*—is limited entirely to the Sierra Nevada and its prolongation southward, at elevations of four thousand to ten thousand feet.

*Sargent's Forest Trees U. S. 192-194. Bot. Cal., Vol. II, 123-554-557.

YELLOW PINE rarely comes down upon the mountain slopes to the edges of the great valleys and basins, but is there supplemented by other species; nor does it ascend the slopes to the timber limit, giving way there also to other species.

The elevation of the lower limit differs with different ranges and with different latitudes on the same ranges, from a few hundred feet to four thousand feet. The upper limit in the mountains of Arizona and New Mexico is at about eleven thousand feet. In Oregon and Washington the YELLOW PINE is supplanted by other species of pine and by fir and spruce trees at elevations of six thousand to eight thousand feet.

THE YELLOW PINE rarely occupies the ground to the exclusion of other trees, but is most frequently accompanied by other species of its own interesting family and by allied evergreens, of which there are many species of spruces, firs, hemlocks, cypress, larch, junipers, etc., in the region mentioned, and, in a few localities, oaks, poplars, laurel, and other broad-leaved trees are co-inhabitants with YELLOW PINE.

PHASES OF DEVELOPMENT.

The Broken-coned pines of the Pacific Slope, if considered as distinct species (*ponderosa* and *Jeffreyi*), which is very much doubted by some observers, present a great many intermediate connecting forms and special characters both of economic and biological importance.

The economical features will be discussed farther on in connection with a "Circular of Inquiry."

Before reaching that, it is pertinent to discuss briefly the life-history, appearance, and the like, of this remarkable and most valuable group of pines.

The first thought that must enter the mind of a reflective observer when he finds himself in a Sierra forest is, that a half dozen or more kinds of pines are about him, and such, indeed, is the lumberman's view of the subject. He sees yellow-barked trees with large longitudinal plates, which, when cleft by his ax, crumble to hundreds of buttons, revealing but a few layers of sap-wood. The next tree met with may have darker, harder bark and more layers of sap-wood. A third tree will intensify these characters, and so on until perhaps not five rods away is a black-barked, low-limbed tree that he might cut almost to the center before reaching the heart-wood. And the cones of these several forms will vary as greatly; generally the smallest cone produced by the lightest-barked tree.

Other species of pines, notably the Long-coned white pines, exhibit great variation, as described under the proper heads, and all dependent upon differences of locality; but here in a given small section of a dense forest it may be, trees of most diverse qualities and characters, yet botanically considered of the same species, are met with in confusing abundance.

Like all the cones of this group—the Base-broken Cones—when matured, separate from the tree by an irregular transverse fracture within the base of the cone, exposing the conical lower end of the receptacle (central column of the cone), and leaving persistent on the branchlet the small, undeveloped, basal scales surrounding a conical pit corresponding to the removed receptacle. In the middle Sierra the cones mature and begin to fall about the middle of September, continuing for a month or more.

The yearling cones are elliptical, one half to one inch long, the pointed scales appressed and directed toward the apex.

The male flowers, discharging their pollen in June, are the largest of any in the family, often three to four inches, usually half that length, always

flexuous and numerous. The yellow pollen grains, discharged in abundance, often fill the air with clouds of dust.

YELLOW PINE.

No. 11. *Pinus ponderosa*, Douglas.—Yellow Pine, Heavy Pine.

The form that is always called the YELLOW PINE is, when fully developed, a tree of the first class, 6–10, even 15–20 feet in diameter, 150–200, or rarely, 250–300 feet high. It may always be detected by the color of the bark, which is usually whitish-yellow (not brown, reddish, or black), generally very thick, 4–6 inches, deeply fissured irregularly into mostly large, longitudinal plates, which are soft, flaky, crumbling before the ax into small, sinuous lozenges or buttons, and releasing a quantity of yellow or orange powder between them. The sap-wood, even of small trees, is very thin, the annual layers of this tree being soon converted into the condition of yellowness and dryness called heart-wood, at a remarkably early age, and so continuing through the life of the tree; trees of the largest dimensions often having but one or two inches of sap-carrying, living wood, leaving the great shaft within perhaps clear of sap or resin for several feet.

The leaves of the typical PONDEROSA, which we are considering, are comparatively short, 6–8 inches, dark-green, never white-glaucous, and, in old trees only, two or three years' growth remain on the tree at a time on the twigs, hence these present a tufted, brush-like appearance.

The cones are always small, 2–4 inches long, of a rich brown color outside, when mature, dark mahogany within; the scales with small, erect, or incurved prickles. The phylotaxy, or spiral arrangement of the scales, presents two principal sets inclined in opposite directions; 5 in one direction, 8 the other; but these spirals, most unexpectedly, are not constant. The spirals of either number may turn to the right or the left on different trees, or even in cones of the same tree.

Such described trees are always called YELLOW PINE. The other forms included by botanists with this, receive other names from lumbermen. The YELLOW PINE, as limited by the foregoing description, is not abundant in the forests, does not comprise the largest number of the trees of any region; hence, is seldom kept separate from the others in manufacturing. This leads to the uncertainty, almost the impossibility, of obtaining statistics of characters and values of the real, true, YELLOW PINE lumber.

VARIETIES OF YELLOW PINE.

The most marked varieties of Yellow Pine are three in number, forming the outlying extensions of the YELLOW PINE forests, whose general headquarters are in the Sierra.

First. Variety (a) *Benthamiana*, Hartweg—Foothills Yellow Pine: This pine was so named by Hartweg, who first met with it in the Santa Cruz Mountains, in 1846, and afterwards on the western flanks of the Sierra, near Auburn. This is usually a medium sized tree, 100–150 feet high, and 2–5 in diameter, with dark, thick, deeply fissured bark, thin sap-wood, and fair lumber-making heart-wood. Young trees are now seen in the region mentioned 10–15 years old, of beautiful, spire-like form, and dark, apple-green foliage, in agreeable contrast to the ashen hue of the GRAY LEAF PINE usually accompanying it, or the still darker shade of the young WHITE FIR and DOUGLAS SPRUCE of the region. The yearling cones are oblong, nearly an inch long on peduncles half as long, drab-gray, with short, appressed,

pointed scales. Mature cones the second season, light green before opening, long and narrow, 3-4 inches long, and 1-1½ as thick, becoming, when opened, long, ovate, truncate, and leather-brown. The seeds are pale, with large—1-inch—transparent wings, slightly veined with brown pigment.

Second Variety (*b*) *brachyptera*, Engel.—Southern Yellow Pine: This pine, so named by Dr. Engelmann, is the form of *PONDEROSA* that inhabits Arizona, New Mexico, and southward into Mexico. It is a small tree, 80-100 feet high, rarely more. Leaves 3-6 inches long, often in pairs. Cones smaller, 2-3 inches long. Seeds small, wings ½-1 inch long, and transparent. A peculiarity of this form is the long plume-like appearance of the branches, caused by the longer persistence of the leaves.

This pine was so named by Dr. Engelmann, from a mistaken impression that the seed-wings were very short. A tree of medium size, 100-200 feet high, and 2-6 in diameter, found abundantly on the San Francisco Plateau, in Northern Arizona, and less abundantly on other mountains of Arizona and New Mexico, extending into the northern States of Mexico, where Dr. Wislizenus first discovered it in 1848. The great plateau of Northern Arizona and New Mexico mentioned is composed of volcanic scoria, the overflow of the great volcano of Agassiz, standing on its northern end, and is covered throughout its extent, one hundred and fifty by seventy miles, with a noble forest of this pine. Minor forests inhabit the summits of the other ranges of the region southward.

Lumber factories have been recently established in this forest, and large quantities of fair lumber is supplied to the usually timberless region of the vicinity. Flagstaff, near the base of Mount Agassiz, is the headquarters of this enterprise.

NOTE.—In later publications Dr. Engelmann admitted the inappropriateness of the name *brachyptera*—meaning short-winged—for the seed-wing of the southern form is not noticeably shorter than those of the typical form; however, under the rules of botanical nomenclature, we are not at liberty to change a name on account of its inappropriateness only. It often happens that a name eminently descriptive when first applied, becomes in the progress of research quite inappropriate, often totally misleading, so that botanists have come to regard descriptive names—so pleasing and satisfactory to the common reader—as not to be insisted upon in giving names, and therefore a jumble of letters forming a word that is short and easily pronounced, but of no meaning whatever, is a welcome appellation, because, while it clearly designates by its use, it can never mislead.

Third Variety (*c*), *scopulorum*, Engelmann—Rocky Mountain Yellow Pine: A small spire-formed tree in the Rocky Mountains, and extending as far eastward as the Black Hills of Dakota. Its bark is thinner and harder than the typical form. A peculiarity of this variety is that it often bears its leaves in twos instead of in threes.

INDIVIDUAL YELLOW PINES.

A tree near Shasta displayed over three hundred annual layers, was seven feet eleven inches in diameter, over two hundred feet long, with few short body limbs; would yield four thousand feet of lumber in five logs of sixteen feet each. (A type of the prevailing form of yellow pine of that region.)

A yellow pine in Sierra Valley was three hundred and twenty years old, two hundred and fifty feet high, six feet in diameter, with whitish-yellow bark five inches thick, in large, longitudinal plates, and crumbling before the ax in scores of small, rounded buttons, one to two inches across. Specimens of this tree—wood, bark, boughs, fruit, etc.—were sent to the Centennial Exhibition, as representative of the typical yellow pine of the Sierra.

A yellow pine near Loyalton was standing, very strangely, in a copse of willow near a running stream; a large, vigorous tree, one hundred and fifty feet high, six in diameter, with typical whitish-yellow bark. Such locations for the yellow pine are of rare occurrence.

A tree of the variety *Benthamiana*, near Auburn, was one hundred and fifty feet high, four feet in diameter, had dark-brown bark, reddish within, and deeply fissured; cones, four to five and one half inches long. A fair type of this variety peculiar for its dark, not yellowish, bark.

Yellow pines are met with in the Southern Sierra of immense size and noble appearance. I have paced across the shadows of some that were twelve to fourteen feet in diameter.

BLACK PINE.

No. 12. *Pinus Jeffreyi*, Murray.—Black Pine, Sap-wood Pine.

The BLACK or JEFFREY PINE, as at present classified, includes a number of forms perhaps arbitrarily separated from the other forms of base-broken-coned pines, and distinguished chiefly by larger cones, by usually smaller-sized trees, more symmetrical contour, with longer-retained, body limbs (hence, less desirable, clear-lumber trees), darker bark, thinner and finer fissured. Sap-wood tardy in changing to heart-wood, hence usually becoming very thick, often comprising the most of the tree trunk; heart-wood consequently meagre, often very little even in large trees; usually resinous and heavy. The leaves are generally longer and stronger than YELLOW PINES when young, and in one form glaucous, as well as the young branchlets, the latter, when broken, giving off the fragrance of oil of orange.

VARIETIES OF JEFFREY PINE.

The forms of broken-coned pines included at present under *P. Jeffreyi*, or BLACK PINE, are readily distinguished by lumbermen as black, red, sap, swamp, bull, hard pine, and the like, according to qualities.

Botanists are able to detect at least four marked forms.

First form: The original *P. Jeffreyi*, of Jeffrey's discovery, in the high valleys 20–50 miles to the north and west of Mount Shasta. This tree is always found at high elevations, at least 6,000 to 9,000 feet, on such formations of the mountain ranges as were first laid bare after the glacial epoch; therefore, the oldest of the broken-coned pines, and perhaps the common parent of all the other forms, including those of the YELLOW PINE described.

This, the typical *Jeffreyi* form, is often a large tree 4–6 feet in diameter, but not proportionately lofty, being rarely over 200 feet high. It usually presents a large, broad, dome-shaped crown in contour, with few long, usually-drooping limbs; bark dark-brown, thick, with large checks; sap-wood thick; the heart-wood not determined; yearling cones, purple, large for the genus, elliptical, $1\frac{1}{2}$ inches long, on peduncles $\frac{1}{2}$ inch long; mature cones very large (the largest of the group), 6–8, rarely 9–12 inches long, elliptical, truncate after falling, purple until maturity, then expanding to long-oval with many scales nearly erect, more strongly spreading than other members of the group; seeds about $\frac{1}{4}$ of an inch long, pale, with brown veins above; wings narrower than other forms, an inch to an inch and a quarter long, $\frac{1}{4}$ of an inch wide, translucent, slightly veined with brown.

Trees of this form, which must be regarded as the true *P. Jeffreyi*, are sparsely met with in many other localities of the Sierra, always at high elevations, usually on spurs or outcroppings of granite, in a westerly or southerly direction, though often in a valley that was early drained of its glacier mud.

They are at once detected by their strange habitat, which is above the common forms of the YELLOW PINE, perhaps in the contiguous forests below, and by the long, drooping limbs and the large, many-scaled longer cones than others of the group. Interesting trees of this description are met with on the flanks of Shasta and Lassen, the numerous peaks of the Northern Sierra, and especially near Webber Lake and Lake Tahoe.

Second form may be designated Variety (a) *nigricans*—Black-bark pine. This form comprises representatives of the dark-barked, long-coned section (*Jeffreyi*) of the broken-coned pines that occupy lower altitudes in the same regions as the other forms, and usually mingled with true *ponderosa*.

Trees of medium size, 120–150 feet high, flourish near stream-banks more than other forms, long retaining their body-limbs, and hence forming symmetrical, spire-shaped outlines. Bark black, hard, thick, rather coarsely checked. Sap-wood very thick; heart-wood consequently meager, usually very resinous.

The Third form may be designated as Variety (b) *deflexa*, Torrey—Red-bark Pine. This form constitutes the principal timber tree of the higher Truckee region, and similar regions north and south of that noted lumber station.

The trees are of the largest size for this section of the broken-cone group, comparatively tall, and free from body-limbs. Bark thick, reddish-brown, hard, coarsely checked; sap-wood not thick; heart-wood of the most desirable quality. Yearling cones apple-green, large, narrowly ovate, $\frac{1}{2}$ –1 inch long, becoming at maturity widely open and 3–5 inches thick at the base, which is truncated. Yearling cones purple, about one inch long, on short peduncles. Mature cones, long-ovate, 4–8 inches long, when fallen, truncate at base and broadly oval by the expansion of the scales. Seeds large, with large, broad wings, 1–1 $\frac{1}{2}$ inches long by one half as broad; translucent with few brown veins. Leaves longer and stronger than the neighboring YELLOW PINE, and white glaucous, especially when young. The young shoots are also glaucous, and when broken they exhale a fragrance similar to the oil of orange.

(This is doubtless the form of pine collected by Dr. Parry in 1849, on the "Summit of the Cordilleries of California," and described as "a handsome tree, with an even, columnar trunk, leaves long, 7–8 inches, slender, sheaths short, cone ovate-acute [the figure is of a cone but $\frac{1}{4}$ grown], apophysis of the cone-scale compressed-pyramidal, deflexed, umbo broad, hooked, recurved, wing twice as long as the seed," named and published by Torrey as *P. deflexa* in Bot. Mex. Bound. Survey in 1858 [but the cone figured was one but $\frac{1}{4}$ grown]. As Jeffrey's discovery, though later made, was earlier published, Balfour's name of *Jeffreyi* for the species is accepted by botanists, and Torrey's disused name of *deflexa* may now be taken up again for this variety.)

Fourth form may be designated, from its locality, Variety (c) *Peninsularis*—Peninsula Pine. It is found only on the mountains of the peninsula of Lower California, east of Todos Santos Bay, at an elevation of about 4,000 feet, and forming an extensive forest upon a substratum of crumbling,



No. 14.—*Pinus Sabiniana*, Dougl.—Gray-Leaf Pine, Tehachapi Mts., Southern California. Alt. 1,800 feet.

1881 1882

white-sand rocks. Trees of medium size, 150-200 feet high, with full, spire-form, or more rounded outlines. Bark grayish or drab, thick, hard, deeply-fissured. Sap-wood not thick, heart-wood undetermined. This noble forest, clothing the central mountains of the peninsula, is almost untouched by the ax of white man as yet, and presents a beautiful appearance with its densely placed trees, interspersed with intervalles and parks of green meadows or sweet-water lakes. This PENINSULA PINE, when standing alone, presents a dome-shaped form, with drooping limbs. Yearling cones very large, 1-1½ inches long, elliptical and purple. Mature cones abundant, many years' crops lying under the trees, all large, broadly-ovate, 6-8 inches long, truncate at base, mahogany colored, with prickles strongly reflexed.

INDIVIDUAL JEFFREY TREES.

A tree of the true Jeffrey type, with brown bark and long, drooping limbs, near Lake Tahoe, was 200 feet high, 6 feet in diameter, with thick, brown bark, deeply and coarsely fissured, extending to the lower part of the upper limbs, the rest whitish and beautifully braided with black. Cones elliptical, over 9 inches long.

Another, near Quincy, was 5 feet in diameter, 175 feet long, dark, almost black bark, deeply fissured on the trunk, braided on the upper portions. Contained 6,000 feet of lumber, worth \$70. A type of many in the vicinity.

Another, in Eddy Valley, near Shasta, was over 200 feet high, 6 in diameter, 240 years old, with dark bark, not braided above. Cones elliptical 9-12 inches long. A type of the original Jeffrey Pine abundant in the vicinity.

A tree of the var. *deflexa*, Torr., the RED-BARK PINE, near Greenville, was 143 feet high, 3½ thick, and yielded 5 clear-cut logs 16 feet long, worth \$50. The earliest formed (inner) foot of layers counted 75, the others 105, showing the early rapidity of growth.

Another, near Truckee, was 170 feet long, 4 thick, yielded 6 logs 16 feet long, worth \$60. First foot of rings 78, the rest 165 rings.

Another, near Webber Lake, was 150 feet high, 5 in diameter, yielding 5 logs 16 feet long, worth \$50.

Another, near Truckee, was 200 feet high, 7 feet in diameter, over 400 years old, and yielded 6 logs, 20 feet long, worth \$80.

This was a type of the large forest of pines of that noted vicinity—now nearly all removed for lumber.

A tree of the variety *nigricans*, the BLACK-BARK PINE, near Beckworth, was 175 feet long, 4½ in diameter, about a foot of the center had become heart-wood that abounded in resin. A type of many of the trees of the region.

Another, near Sierra Valley, was 5 feet in diameter, 175 feet long, 240 years old, with thick black bark, deeply fissured below, nearly smooth above. Yielded 6,000 feet of lumber, worth \$70. A type of many trees in moist situations.

A singular tree, in an open situation near Sardine Valley, was 200 feet high, 5 in diameter, with very thin black bark only ¼ inch thick. Cones very large, with prickles strongly deflexed. A rare exception to the usual condition in the thinness of the bark.

Another tree, near Sisson, was 220 feet high, 340 years old, 6 feet in diameter, with dark, deeply cleft bark, and numerous body limbs.

HEAVY-CONED PINES.

SECTION B. MOSTLY LATERAL, PERSISTENT-CONED, COARSE-GRAINED PINES.

Cone, lateral, *i. e.*, arising along the bearing shoots at some distance from the apex; verticillate or clustered and declined, mostly not falling at maturity; but persisting, and either becoming inclosed by the later layers of wood, or the peduncle is stretched and at length broken by the enlargement of the tree, and the cone is carried outward confined in the bark.

Seven species on the Pacific Slope, six in California, mostly near the coast; in two unequal groups, a pair and a trio, with a solitary species between.

GROUP 5. HEAVY, SPINE-CONE, LONG-LIMBED PINES.

Cone of the heaviest, largest, and hardest description, on long, stout, spreading peduncles, opening at maturity and scattering the seeds, but usually remaining persistent until forced off by the enlargement of the tree, then leaving often a few basal scales persistent. Scales, very large, broad, and thick, terminating in long, stout, incurved hooks; seeds, large, black, and thick-shelled, edible; leaves, in threes, very long. Male flowers an inch long.

Picturesque trees of the interior foothill regions, remarkable for their usually divided trunk or very long limbs, and for their very heavy, spine-bearing cones.

The two heavy-coned pines form a very distinct type of development; massiveness and protection being the leading ideas. These trees are never slim and feeble as those that are crowded into groves, but are always scattered more or less, and, therefore, have room to broaden out or branch freely. They inhabit the hot, scorched hills and sun-filled valleys, contending there for space with dwarfed oaks, manzanitas, and chaparral.

It would be interesting to discover what end is subserved by the exceeding size and firmness of their fruit with their formidable armament of spines. That it is a special adaptation of conditions to environment we may be sure; that all the special developments they display are modifications of defensive or offensive weapons used in the warfare of life is granted. Now what are the obstacles to the enemies of this line of development? The regions they inhabit are peculiarly exposed to the keenest action of the sun's heat, without mitigation by cool ocean atmosphere, or protection by sheltering forests. No doubt a thick, strong investment of carpellary scales defends the ovules during growth better than would a light covering of thin, soft ones.

Another consideration: The regions these pines occupy are usually infested beyond precedent the world over with colonies of ground squirrels that—as may be seen at any time by examining the cones lying about their quarters—find it very difficult to gnaw into the matured, hard-scaled and forbiddingly armed cones of these pines, whose large seeds would perhaps otherwise furnish abundant squirrel food, and these species would, therefore, suffer abridgment or even total extinction.

And, too, it may be that the thick-scaled fruit of these trees is better fitted to resist the attacks of depredating insects that infest and, in noted forest regions, nearly render abortive the seed crops of certain soft-scaled pines and spruces.

BIG-CONE PINE.

No. 13. *Pinus Coulteri*, Don.—Big-Cone Pine, Coulter's Pine.

Dr. Thos. Coulter, another indefatigable Englishman, had the good fortune to discover the BIG-CONE PINE in 1831, together with *P. muricata* and several other interesting trees, while on his way from Mexico to Alta California. At Monterey he fell in with Douglas, who thus describes him: "Since I began this letter Dr. Coulter, from the Central States of the Republic of Mexico, has arrived here, with the intention of taking all the plants he can find to DeCandolle at Geneva. He is a man eminently calculated to work, full of zeal, very amiable, and I hope may do much good to science. As a salmon fisher," he adds, showing that this industry was, as now, prosecuted at that place, "he is superior to Walter Campbell, the Izaak Walton of Scotland, and he is a beautiful shot with a rifle, nearly as successful as myself. I do assure you," he continues, "from the bottom of my heart it is a *terrible* pleasure to meet a really good man, one with whom I can talk on plants."

In order to understand the importance of the discoveries of Dr. Coulter—the journeyings, the sharp-sightedness necessary, and the indomitable perseverance of the man—it will be necessary to sketch briefly the south coast ranges of mountains, which are of much forestal importance as the habitat of several quite local species. They all begin like rays or spokes on one side of a wheel, commencing at points or promontories on the coast, and extending inland. They converge at a point or plexus of high peaks at the south end of the San Joaquin Valley and opposite to the Tehachapi or southern end of the great Sierra. The longest ray is that of the Santa Cruz Mountains, beginning with Point Lobos, on the peninsula of San Francisco. Below Santa Clara Valley it is joined by the Mount Diablo Range, and continues down, forty to sixty miles from the coast, to the place of meeting. This is a low range, and being flanked on the coast side by another that has first access to the ocean atmosphere, it suffers the loss of moisture, and its forest, consequently, displays the deprivation by developing but few trees.

The next range, the Santa Lucia, begins with Point Pinos, with its interesting and very local species, the MONTEREY PINE, and extending south-eastward it traverses Monterey and San Luis Obispo Counties, well watered the while on its way to the junction mentioned. This is a much diversified, steep-sided mass of mountains that consequently must furnish rare forms of development, though this must have been unknown to our pioneer explorer.

The third range, the San Rafael, with its promontory at Point Sal, on the northern boundary of Santa Barbara County, extends nearly eastward to the junction in a direction unfavorable to the catchment of moisture; hence found to be devoid of remarkable flora.

The fourth range, or wheel spoke, the Santa Inez Mountains, begins with the noted Point Concepcion and extends due eastward to the plexus of peaks.

Immediately southward of this range the ocean has approached parallel and washes the foothills for a distance of 80 to 100 miles, the northern currents of air caught by the light range described, are utilized by the production of a peculiar and abundant forest also.

Missing the few little dwarfed and depressed trees on the limited bluff of the San Diego coast (TORREY PINE), Dr. Coulter passed along scanning and exploring every reasonable locality for trees, making some trips of

such great difficulty as to be but seldom repeated since, and collecting nearly all the rare forms of the region.

Noticing the trend and the elevation of the ranges one after another, he fixes his attention at last upon the Santa Lucia, and penetrating to its highest elevation, which he learned that the Mexican inhabitants called the "Crusta," a few miles southeastward of the present town of San Luis Obispo, he finds thereon, crowding its white sand peaks, a species of pine, the like of which was never seen before. Tall, large branching trees were loaded with monstrous and heavy cones of several pounds weight, most of them still attached to the trees, all armed with huge, hooked spines, while the large leaves were half as long as his arm.

No wonder the intelligent explorer became greatly excited over his discovery, and when, a short time after on his way northward, he added the little egg-shaped PRICKLE-CONE PINE to his discoveries, we can willingly excuse him for holding his head well up when he met the veteran explorer Douglas at Monterey; and in his zeal he tried to make several species out of the materials in hand.

Strangely enough this same sturdy climber, penetrating the Santa Lucia at a third point, discovered and secured good specimens of that most beautiful and curious of fir trees, *Abies bracteata*.

In May, of 1887, Mrs. Lemmon and I climbed to the original locality of Dr. Coulter's discovery of the BIG-CONE PINE, to wit, the "Crusta" of the Santa Lucia Mountains.

The trees can be plainly seen from the town of San Luis Obispo, just peeping over the highest peaks. The day was hot, the way is steep, and the sand moved under foot, but thinking of Coulter's climb thirty-six years before, and his triumphant success, gave us courage to struggle with the hardships and to succeed, as he did.

And the BIG-CONE trees, what more interesting sight in California—in all the world? Large, tall, long-armed trees holding out seeming baskets of fruit; other baskets fresh, and empty or discolored with age, strewn beneath, each basket, when examined, being an oblong cylindrical mass of hooks a foot or a foot and a half long and one half as thick, so heavy that you take both hands to raise them from the ground, the fresh ones still discharging their dark, large-winged seeds.

Upon examination this group of trees comprise a forest of some considerable extent, being several miles long, irregularly distributed over the flanks of the peaks. The largest of the trees are one hundred and twenty to one hundred and fifty feet high, three to five in diameter, and with dark, deeply fissured bark. The leaves in this locality are of the largest and longest description, eight to fourteen inches long—the largest of any in the Pine family.

The general appearance of the trees reminds of the typical *Jeffreyi*, the flowers being very similar, the seeds and their wings but little larger, while other characters of leaf and cone recall the TORREY PINE.

The male flowers growing in tufts near the ends of branchlets are of a light creamy color, the spikes ovate-oblong (one inch), and half as thick. But it is in the cones that this species excels all others. Generally singly, but often in pairs, or rarely in threes, they hang in an inclined position from the limbs, their shining, spine-covered proportions half protruding beyond the long leaves, often a foot or so.

Like the other pines of its section—GRAY-LEAF, MONTEREY, KNOB-CONE, and PRICKLE-CONE—they are mostly long-persistent, though quite variable in this respect. Sometimes the remains of cones are seen deeply imbedded

in the bark of large trees, the larger part of the cone having broken away and fallen.

During the latter part of June, of the present season (1888), we proceeded to a noted range of mountains for the study of forestry, that of the San Bernardino, and pitched our tent in the cañon of Mill Creek, about eight miles above its mouth.

Here, at an altitude of about 1,700 feet, robust, symmetrical trees—BIG-CONE—were met with most unexpectedly, when we recalled the high mountain top of the other region, these being along the water-courses, while above them appears a species of spruce which, elsewhere, is a lover of damp, shady situations, namely, a variety (?) of the DOUGLAS SPRUCE.

Further up the cañon and up the slopes of the mountain, generally to an altitude of 6,000 or 7,000 feet, were other and very large trees of this BIG-CONE, interspersed with others of the family, notably the southern form of the Jeffrey pine, which here it closely resembles in the characters of its long, spreading limbs, but always to be distinguished by its darker, denser foliage, added to its ponderous fruit characters.

Evidently the timber of this pine was once used for lumber, for here, in the upper portion of Mill Creek Cañon, are the ruins of a lumber factory, and the clean stumpage, including every accessible tree in the vicinity, shows that no discrimination was used; but the mill was deserted over twenty years ago, and no one could be found who could give any opinion as to the character of the timber the Big-Cone Pine produces. It is probable, however, that the trees being generally on higher locations, with harder bark and closer grained sap-wood, it makes better lumber than the Gray-Leaf Pine.

GRAY-LEAF PINE.

No. 14. *Pinus Sabiniana*, Doug.—Gray-Leaf Pine, Sabine's Pine.

It was when David Douglas made his second visit to the northwest coast of America, in 1830, that he explored the region around Monterey Bay, and discovered first, of course, *P. insignis* right at the ship's wharf, and subsequently the Gray-Leaf Pine farther interior, making the announcement to his London friends:

"I have added a new and most interesting species to the genus of *Pinus*, viz., *P. Sabiniana*, and which I discovered in 1826." [This is an error; the pine of that allusion was *P. Lambertiana*, far to the northward.] "When compared with many of the genus inhabiting the western part of this continent, its size is inconsiderable, not above 110-140 feet high and 3-5 in diameter. It grows in aqueous deposits (?) on the western flanks of the Cordilleries of New Albion" [once the name of California], "at the elevation of about 1,600 feet above the sea and below the line of perpetual snow. I sent a detailed account of this most beautiful tree to be published in the transactions of the Horticultural Society."

It was first published, however, in the great illustrated work of Lambert in 1842, in the following words: "Native of the Cordilleries of New Albion. Discovered by our indefatigable friend, Mr. Douglas, who was the first to open to us the vegetable treasures of the little-known regions of the Western Hemisphere."

Douglas named it in honor of his early friend and patron, Joseph Sabine, "the zealous Secretary of the Horticultural Society." In this first description is noticed the curious fact of the great change of appearance the cone undergoes, "during the first year rounded and bright green, when perfected the following November, elongated and brown." But throughout, no men-

tion is made of the divided or long-branching habit of the tree, or of its sparse foliage and its light-greenish color.

The northern forms of this species are usually marked by thinner foliage and less strongly-hooked cones than southern ones. In the Sierra foothills, near Auburn, the leaves are very few and light colored, while the plant is often attacked at every stage of its growth by parasites, the most deadly of which is the pine-girdler, a fungus treated of elsewhere under "Enemies of the Pine."

In southern sections, notably in the upper (southern) end of Salinas Valley, this pine is much less attacked by parasites, and the trees usually display heavier, but still light and airy foliage, produced principally at the ends of the upright branchlets. On the Tehachapi Mountains the trees are quite dark green, with abundant foliage, large cones with strong hooks, etc., in these respects closely approaching "BIG-CONE."

If this were the only difference it would be difficult to distinguish the two, but the larger seeds and short wings always distinguish the GRAY-LEAF from BIG-CONE, with its half-size seeds and very large wings.

These Tehachapi trees also exhibit very long peduncles, 4-6 inches long, and make their downward turn near the end, during the first season.

The GRAY-LEAF PINE, on account of its divided or freely branching habit, often resembles a willow more than a pine, while its light, almost pea-green foliage at a distance on hill-sides reminds one of clouds of smoke.

When the Europeans first began the occupation of California, they found the aborigines of the coast region, called by them "Diggers," subsisting for a part of the year upon the seeds of this pine, and so the tree was nicknamed "Digger Pine." But since a few individuals only now survive, and these prefer the white man's flour to climbing trees for pine cones, the uncouth name for this interesting tree should be discontinued for one which must always be characteristic, as it is derived from its most striking character—to wit: its singular, long, grayish leaves.

So fast does the GRAY-LEAF PINE grow, and so coarse are its grains, that lumber made from it is much given to warping if exposed to heat, or decay if it touches the earth. A lumber factory in the Huerhuero Valley, near Paso de Robles, annually makes a quantity of poor lumber for indoor, sheltered work, but as a rule this species, wherever found, is not used for either lumber or fuel, while its usually thin foliage prevents it being very desirable for shade or shelter.

INTERMEDIATE, SOLITARY SPECIES.

A peculiar lone species (perhaps a vestige of a former forest), in classification between the pairs of this group; the cones being often both sub-terminal and lateral, also sub-persistent, etc.

TORREY PINE.

No. 15. Pinus Torreyana, Parry—Torrey Pine, Lone Pine.

A few small trees buffeted, often prostrated, by ocean winds on the bluffs at Del Mar, San Diego County; and a smaller number (about 100) detected the present season (1888) by T. S. Brandegee, on the east (the shore) end of Santa Rosa Island, 120 miles north of the other locality.

The TORREY PINE, as shown by preceding characters, is a curious species somewhat anomalous in its natural history, and exciting great interest on account of its small representation, only a few trees existent, the singu-

larity of its locality, mostly in a limited ocean bluff region, 50 miles from any other trees of the Pine family; and from the vigorous appearance of the few individuals that hold tenaciously to the soft sand rock, and produce large, sound cones in larger quantity than relatively larger trees do in apparently more favorable localities.

A doubt has been lodged against the priority of Parry's name for this pine in favor of Loiseleur's name of *P. Californica*, given in 1787 to specimens of a pine collected by Colladon, the gardener of the expedition of La Perouse, near Monte Del Rey. "The cone," the chronicler relates, "was of the form of *P. pinaster*, but one third larger in all its parts. Leaves in twos or threes; seeds of the size of *P. cembra*." [Which would be very large; indeed, the only character given that at all accords with our *P. Torreyana*.]

"Seeds were taken by Colladon to France and sown in the Jardin de Plant, 12 of which produced trees. Most of them were sent to the south of France [and no further account of them is given], but the one that remained stood unprotected in open ground, seemingly vigorous and in good health in 1812, when it was 7 feet high, slender, with dark-green leaves in threes, about 3 inches long."

[Evidently the tree described is *P. insignis*, and there is no evidence whatever that any one collected the Torrey Pine until, as stated in Dr. Parry's historical paper, herewith published.]

The Torrey Pine is found distributed sparsely along the coast on both sides of Del Mar, in all extending a distance of about four miles. The bluff is broken in places, exposing the soft yellowish sand rock, to which the trees are found clinging, but not so numerous as on the smooth storm-beaten decline of the bluff or partially protected hollows behind it. All are apparently young trees, none seemingly over 80-90 years old, with little or no signs of previous generations. Young trees are seen in several places of all ages, but not equal in number to the present mature trees.

Query: Is this most singular species dying out, or is it just coming in?

The trees bear well when quite young—12-18 years old. Yearling cones are globular, about $\frac{1}{2}$ inch thick; the second season they become ovate and $2\frac{1}{2}$ - $3\frac{1}{2}$ inches long; the third year they open and discharge the most of their seed, and the fourth season they usually fall with the remaining seed held in the lower fully developed scales, leaving a few of the still lower undeveloped scales on the branchlet. In this character of tardy maturity and retention of seed, this pine is closely connected with the classical *Pinus pinea* of the Greeks, and the one chiefly alluded to in ancient references to the pine (in Greek *pitys*).

SPECIAL STUDIES OF THE TORREY PINE.

There are on the heights back of Del Mar, in broken ravines, some dozen trees not in good condition, however, with several dead trunks that have recently succumbed to the effect of unusual water-washings of the soft rock.

Of the northern ravines the first contains 5 trees, all somewhat decrepit; the second ravine contains 19 trees, about one half of them young—from 6-10 years. One tree on the tableland, a few feet away from the ravine, and about 150 feet above the sea, is 3 feet 2 inches in circuit, 18 feet high, and about 25 years old; fruit sparse; condition good; leaves persisting upon 2-year old stems, and very large, 9-12 inches long.

Another tree, clinging to the south side of the ravine, is 2 feet 8 inches in circuit, 23 feet high, and appears to be about 20 years old. Fruit sparse,

one 2-year-old cone, four yearlings, and three infants. Leaves abundant and strong.

A third tree, in the upper end of the ravine, altitude 200 feet, in loose soil, is 1 foot 8 inches in circuit and 30 feet high, being protected in its growth. Appearance bad, apparently succumbing to environment.

The third ravine contains fifteen trees, five of them under age, with a few dead ones, killed, perhaps, by accidental fires.

A tree, near the upper end, on the floor of the gulch, well anchored in the loose sand rock, was last season a fine round-topped tree, filled with cones, but killed recently by an accidental fire, to the great regret of the owner of the premises. This is the largest tree in the north region; 4 feet 11 inches in circuit, 25 feet high, and must have been in good condition when attacked by fire, for it still retains sixty-three two-year-old cones.

Lower down in the ravine about 150 yards from the high water line and quite near the railroad track stands a fine tree 3 feet 6 inches in circuit, 25 feet high, about 25 years old. Condition good, but being quite accessible, the cones are removed as soon as formed.

The fourth ravine contains sixteen trees mostly of full age and in fair condition. Some apparently dying out from causes that it would be interesting to study.

The fifth northern locality noted for this limited tree is the south steep bank of the San Dieguito River, where sixteen trees are found clinging to the half exposed rock. On several trees cones in triplets were seen, indicating, in connection with vigorous appearance and large leaves, that this is a favorable region for best results, the perfection of seed.

A few trees maintain a feeble existence in pasture lands across the low tide water river on the north bluff but, practically, the San Dieguito limits the trees in this direction, about two miles north of Del Mar. South of Del Mar about $1\frac{1}{2}$ miles, on the ravines that fall into the Soledad River, and upon the bluffs beyond, are collected the largest number of trees; too numerous and distributed for easy determination, but not above a few hundred individuals in all. The region is a gradual incline from a sheer bluff beetling over the surf to an elevation $\frac{1}{4}$ of a mile inland of 400-600 feet. It is, like all the other stretches of this beach, broken here and there by recent excavations.

On the exposed slopes towards the sea these trees are crouched as though stealthily beating their way athirst to reach their arms into the raging flood; or they may be resisting extirpation. Unwilling to leave the sacred soil of their ancestors, they suffer themselves to be beaten prostrate before releasing their strong hold of the ground.

However this is, their condition is most robust and their fecundity most abundant and successful. Here are found the best bearing trees with cones of the largest size with largest seeds. Some trees that creep along for 20-30 feet, their bowed limbs often overlaid with soil, send up here and there stout, short branches that are loaded with whorls of heavy cones, from the sand-covered base to the leaf-tufted summit. And young trees, even seedlings, are met with on these wind exposed slopes in greater number than elsewhere.

Surely this Torrey Pine loves the sea, and clings to its water-nourished confines with wonderful tenacity, like a reckless warrior fighting for vested rights. In the sheltered cross ravines, a few rods back from the sea, the trees become tall, and even stately, though here also are exhibited greater signs of decrepitude.

No. 15.—*Pinus Torreyana*, Parry.—Torrey Pine. "Torrey's Crown," back of Pine Point. Bluffs of Del Mar, near San Diego. Alt. 600 feet.





Several dead and dying trees are met with, but all seem of the present generation. No holes in the sand or mounds of up-turned earth were detected in all the region, indicative of long gone generations.

Young trees were noted in several localities, some just struggling above the grass and flowers. Spade holes here and there show that trees have been lately removed for cultivation; also a few stumps are seen, but generally north and south throughout the groves the trees seem to have been allowed to remain unmolested. Notwithstanding this happily untouched condition of these trees, with the influx of immigration this lovely seaside resort of Del Mar is destined to receive a large population, and then these trees will be menaced with extermination at the hands of men, unless steps are taken to protect them, as suggested in the closing paragraph of Dr. Parry's historical paper, hereafter cited; or better, they should be preserved by the State of California through the effort of proper legislation, and the State Board of Forestry is the proper party to look after the matter.

TORREY'S PINE.

By J. G. LEMMON, in "Pacific Rural Press," of April 23, 1888.

Scientists the world over and lovers of nature generally will be interested in an investigation now going forward concerning the life history, and habits of California Pines, including the rare and curious Torrey Pine—*Pinus Torreyana*—on the coast of Southern California.

A mournful interest attaches to this pine, from the fact that there are but few trees of it left, and these in a certain locality limited to a few miles of the sea coast hills, at and on both sides of the beautiful and newly established watering-place of Del Mar, San Diego County, through which town passes the Atchison and Topeka Railroad, from San Bernardino to San Diego.

The bluff or mesa at Del Mar is high and unbroken for two miles, but about two miles distant, on each side, occur cañons and breaks in the mesa, and on the sides of these cling the few Torrey Pines, for the most part gnarled and beaten prostrate by the buffeting winds from the Pacific.

On the sheltered inner side of the hills, and on the spurs of the cañons, however, the trees remain erect, and here are found the largest specimens, a few trees measuring nearly two feet in diameter, and elevating their flattened crowns to a height of thirty to thirty-five feet.

The trees are prolific bearers, the cones of three different years' origin being found abundantly on most of the trees; these, when mature, the second year, are above the medium size, four to five inches long, ovate, with few large, thick scales, terminated by short, strong, but not formidable prickles.

The nuts are very large, nearly an inch long, but slightly flattened, brown, with a narrow, thickened, black wing. The shells are thick and hard, requiring a smart blow with a hammer to fracture them. The seeds are very oily and delicious to the taste.

The pollen-bearing or male flowers are terete, very large, two to two and one half inches long and three eighths of an inch in diameter.

The leaves are in fascicles of fives, very large and strong—the strongest pine leaves known—and are six to twelve inches long.

In many respects this species of pine stands alone among California conifers. No other species is found within fifty miles of it; none other survives such buffetings by the sea winds, and no other bears such large flowers, hard nuts, and such strong leaves.

The trees are comparatively rapid growers, individuals two feet in diameter being often not more than forty or fifty years old.

In the few localities young trees of all ages are found, but always less in number than the older trees, from which it is inferred that the species is slowly succumbing to its environment, and must, if not protected, soon become extinct.

As the visitor for the first time views this curious pine, he is struck by the persistence of its character, and the suggestion at once occurs that this is the species of pine from which most might be expected by planting it along the now deforested coast hills of California.

Seeds will be sent for propagation to the Forestry Experimental Station at Santa Monica, and no doubt in a few years trees from there may be had for trial on proper application.

HISTORICAL NOTICE OF *PINUS TORREYANA*.

[By its discoverer, DR. C. C. PARRY.]

Read before the San Diego Society of Natural History, Nov. 2, 1883.

In the spring of 1850, when connected with the Mexican Boundary Survey, my attention was first called to a peculiar species of pine growing on the Pacific Coast at the mouth of the Soledad Valley, San Diego County, by a casual inquiry from Dr. J. L. LeConte, the distinguished American entomologist, then staying in San Diego, asking "what pine it was growing near the ocean beach at that locality?" Not having any specimens to show, he simply mentioned at the time its dense cones and its long, stout leaves, five in a sheath. Not long after an opportunity offered the writer for a personal investigation, having been ordered by Major W. H. Emory to make a geological examination of the reported coal deposits on the ocean bluff above Soledad.

In making a section of these strata (see report of the Mexican Boundary Survey, Vol. I, Part 2) it was necessary to follow up some of the sharp ravines that here debouch on the ocean beach, and here (possibly to the neglect of strict geological duties) my attention was taken up by this singular and unique maritime pine, which, with its strong clusters of terminal leaves and its distorted branches loaded down with ponderous cones, was within easy reach of botanical clutch. From the notes and collections there made a description was drawn up dedicating this well marked new species to an honored friend and instructor both of Dr. LeConte and the writer, viz., Dr. John Torrey, of New York, as *Pinus Torreyana*, Parry.

Of the few specimens then collected a single cone and bunch was sent to Dr. Torrey to be figured for the Mexican Boundary Report (Vol. II, p. 10, pl. 58-59). While there it fell under the notice of some inquisitive botanist, who extracted some of the loose seeds, which were planted, but by some inadvertence were mixed with another three-leaved species. When growing the two different kinds became confounded, and it was inferred that the present discoverer was mistaken in regarding this species as five-leaved.

Professor Parlatore, the elaborator of *coniferæ* in Candolle Prodrômus, added to this confusion by ignoring the name first proposed and substituting that of *Pinus lophosperma*, but fortunately the earlier publication of the Mexican Boundary Survey, with an accurate figure, permanently fixed the name of *Pinus Torreyana*, Parry, thus commemorating one of our most honored American botanists by association with a tree peculiar to the

Pacific Coast, in a region which had been so often enriched by his early botanical labors as a collaborator.

Subsequently frequent collectors have visited this locality, bearing away to the remotest portions of the world seed of this pine, which, as far as is known, is exclusively confined to a coast line of not more than four miles, lying between San Dieguito and about a mile below Soledad, and extending scarcely a mile inland.

The bulk of the tree growth is here mainly confined to a series of high broken cliffs and deeply indented ravines on the bold headlands overlooking the sea south of Soledad Valley, and within the corporate limits of the town of San Diego. Here, within a radius of not more than half a mile, this singular species may be seen to the best advantage, clinging to the face of crumbling yellowish sandstone or shooting up in more graceful form its scant foliage in the shelter of the deep ravines, bathed with frequent sea fog. One of the finest specimens seen reaches a height of nearly fifty feet and shows a trunk eighteen inches in diameter at base.

Thirty years after this first discovery (to wit, in the fall of 1880), the writer visited this locality for the second time, accompanied by the well known botanist, Dr. George Engelmann, of St. Louis. At that time more complete examinations were made, and sections of a trunk over one foot in diameter were procured and sent to the Forest Commission of the Tenth United States Census.

Here, perhaps, personal mention might properly close, but this evening, in the presence of the members of a Natural History Society in San Diego, I may be pardoned a further digression. Only a short time since the writer again visited the locality, aided by the liberality of the California Southern Railroad Company, whose track makes this fine resort easily accessible by barely an hour's travel from San Diego. Here, seeking shelter from the fervid rays of a February sun under the scant shade of a decrepit forest monarch, listening to the sullen dash of the Pacific waves against the bold shores, among other unmentionable thoughts suggested by the inspiring scene and its past associations, one floats uppermost like drifting seaweed and finds a fitting expression here. Why should not San Diego, within whose corporate limits this straggling remnant of a past age finds a last, lingering resting place, secure from threatened extermination this remarkable and unique Pacific Coast production so singularly confined within its boundaries; dedicating this spot of ground (utterly useless for any agricultural purpose) forever to the cause of scientific instruction and recreation, where wiser generations than ours may sit beneath its ampler shade, and listening to the same musical waves, thank us for "sparing this tree?" And finally, why is not the San Diego Society of Natural History the suitable body to recommend such action?

PINUS TORREYANA ON THE ISLAND OF SANTA ROSA.

[Letter from the Discoverer.]

SAN FRANCISCO, CALIFORNIA, September 26, 1888.

J. G. LEMMON, Esq., Oakland, California:

DEAR SIR: I will answer your questions about *Pinus Torreyana* as well as my memory will allow. The soil in which they grow is a mixture of earth and loose rock, or sometimes earth of some thickness resting upon solid rock. They grow on a bluff of the eastern end of Santa Rosa Island, at an elevation of about five hundred feet above the ocean, and quarter of a mile from it; the extent of the habitat is in length about one quarter mile, and number of trees about one hundred. They are erect and of all sizes up to thirty feet

to be sure, but published later, as was the case of Douglas' *insignis*—Don's description of *radiata* antedating Loudon's of *insignis* some seven years. And the minor parts of Douglas' descriptions given are not free from discrepancies—owing, no doubt, to misplacement of labels—as instanced by the two localities given for the pine and the two very different vernacular names for the species.

Beautiful as it is, and appropriate as it is, the name of *insignis* for our MONTEREY PINE finds lodgment in the majority of authors' publications, it appears, principally upon the arbitrary, but permissible, selection of it by such preëminent authorities as Dr. Engelmann.

VARIETIES OF MONTEREY PINE.

Variety (a) *radiata*, Don—Spreading-Cone Pine: The large-coned form of Monterey Pine, with shorter, thinner leaves than the typical. Mostly southward from Point Pinos. This form, as *P. radiata*, Don, was described from large cones "five and three fourths inches long by three and a half broad at the base, which was gibbous, with large tubercled scales." According to Gordon ("Pineturn," page 282): "This beautiful pine (*radiata*) resembles *P. insignis* in some respects, but differs very much in foliage and cones, the leaves of *insignis* being much longer and stouter than those of *radiata*, while the cones of the latter are three times the size of those of *insignis*, and with scales much more elevated," etc., characters which distinctly distinguish a form of this pine mostly found to the southward of Point Pinos, where Coulter first collected it. Therefore, for all these considerations, I have in these papers taken up Don's name of *radiata* and applied it as above to this marked variety, as, doubtless, it was first so used.

Variety (b) *levigata*—Nearly Smooth-Cone Pine: Cone smaller, and shorter than the typical, and scarcely tubercled. Outlying trees of the Monterey forest, farthest from the sea. This form detected lately on the outskirts of the forest is quite marked by its small size, long, slender leaves, its few cones nearly ovate, and often with no raised tubercles; the prickles also small and weak. Being, then, nearly smooth, as compared with the typical form, this may be given rank as a marked variety, as above.

The Monterey Pine grows very rapidly, trees now covering the part of Point Pinos, called Pacific Grove, averaging about 2 feet in diameter, while they are only 20-30 years old. Early settlers tell of riding over the promontory at will, unobstructed by trees, although a forest of large trees clothed the southern part of the present pine region at the time. A few of this older generation still survive, often showing injuries by fire kindled by Indians; but upon cutting into them it will be found that these, too, were rapid growers—trees 4-6 feet in diameter displaying only 80-90 rings, with those near the center a half inch or three fourths, and even a full inch thick.

John Myers, who was associated with Hartweg and with Lobb in their discoveries about Monterey in 1846-1850, still resides at Monterey, and has full recollection of early events. He states that a person named De Graw, owning a wharf where now is the Chinese fishing beach, erected a sawmill near the vicinity about 1850, which in 1856 was removed to an interior locality—Sawmill Gulch—where all the valuable timber was soon cut off, manufactured into lumber, and, according to J. O. Johnson, of Pacific Grove, some of it was shipped to San Francisco for constructing its early wharves, sidewalks, etc.

Of course this was at a period when the hard lumber pines of the interior were unknown, and the monster redwood, but a little way northward, was only beginning to be cut by a factory located near San Rafael.

The illustration is taken from a small, solitary tree, near the lighthouse at Pacific Grove.

Ever since the landing of the Franciscan padres at Monterey, in 1770, the lovely grove of dark-green pines has been much frequented by lovers of the beautiful and good. For a charming presentation of the beautiful and religious sentiments and associations connected with this noted pine, I am deeply indebted to the accompanying contribution from the gifted pen of a well known authoress:

UNDER THE PINES AT MONTEREY.

Contributed by Mrs. M. H. FIELD, of San José, California.

"The groves were God's first temples." Far back in Hebrew history we find the prophets crying out against the high places of Baal and the groves of Ashtaroath, evidently once sacred shrines then degenerated into abodes of idols and scenes of devil worship. The old Greek had his oaks of Dodona and shady haunts of Delphi, while every wooded knoll was the home of a god. The Romans set up the Greek gods beneath their own olives and cypresses. Men may still retrace the steps of Him who loved to walk upon the Mount of Olives for prayer and meditation, and the oak forests of Britain and of Scandinavia were the haunt of David and of prophetess.

The beauty and the inspiration of Gothic architecture lie in its close resemblance to the upspringing arches of a great forest, and are felt by every human heart. A tree with its uplifted arms and sun-crowned head seems an embodied prayer, and we can scarcely stand beneath one unsolennized. The trees preached better than the preachers in the camp meetings of the last century, and it is a pity our roofs so shut them out. Every primitive community has been swayed powerfully by these great outdoor meetings, and that grand pioneer church, the Methodist, has always wisely laid hold of this element of strength. Thus it came about that the early fathers of Methodism on this coast, where outdoor meetings are so smiled upon by nature, made the camp meeting a prominent feature of their work. They were not long in finding out that the south side of Monterey Bay had a rare natural adaptation for this use. Here was the wide forest; here was the solemn sea; here was the rainless sky. Like Abram of old, the preacher "pitched his tent there, and there he builded an altar unto the Lord, and called upon the name of the Lord." It has remained there ever since, and the atmosphere still has an element of consecration as perceptible as the salt breath of the sea, or the fragrance of the forest.

Another great popular movement, the Chautauqua Literary and Scientific Circle, took its rise in a camp meeting, a true daughter of the old Anglo-Saxon "folk mote," at Chautauqua Lake, New York. It has spread all over the United States and Canada, until every State has its "Summer Assembly of the C. L. S. C.," where a veritable "Grove of Academe" is metamorphosed out of some ordinary group of elms, or oaks, or pines. The California Chatauquans found this beautiful Point Pinos, at the south side of Monterey Bay, already occupied and made ready for their use by the Methodist pioneers. They had only to come with tent and note-book, and take possession. Very pleasant were those days of '79 and '80, when tents were in the ascendancy, and cottages an aristocratic and disapproved of

intervention. But those days have gone forever. The cottage and villa have won the day, and the woodman's ax is doing its ruthless work of "improvement." Yet the pines are not wholly exterminated, thank Heaven! Still, the approaching stage seems to be carrying its occupants into some green and sylvan wilderness, and one can lose the sight and sound of humanity in a few moments' walk.

Oh, these beautiful, mournful, music-haunted pines. They clothe the whole long promontory with a garment of loveliness. Wherever they have been undisturbed they spring up in tall, straight groups, and so mingle branch with branch, and top with top, as to shut out the sunshine and almost hide the blue, over-arching sky. But fire and tempest, and the destructive ax, have thinned out their ranks until open spaces and broad vistas are the rule and not the exception. The ocean gleams in every picture, and its voice rises majestically over every other sound, but the murmur of the pines may always be heard in soft antiphonal response. The one voice is awe-inspiring, the other soothing and comforting. The one crushes with its relentless power, the other lifts up with its whispers of hope and courage. The mighty sea winds toss the pines rudely and the salt spray dashes over them, but they rise again with undying bravery, like a dauntless human heart.

On a sunny day nothing can be more exhilarating than a walk among these pines. The flickering shadows lying on the elastic mass of fallen needles which soften the path, the twitter of birds, the gentle whispering forever going on overhead, the perfect greenness of the forest tints, the lovely balsamic odors, all combine to charm the saunterer; but on a gray or rainy day the Monterey pine is wonderfully sympathetic. A weird sadness seems to have seized upon its spirit. It sighs and moans. It drips slow tears upon the traveler, or upon his roof, and the long pennons of moss, with which it has decked itself, wave like signals of distress. Sometimes in moonlight the spirit of the pine seems cheerful, or at least clothed with tender sentiment and a silvery smiling content, but on a dark, starless night, one would need a clear conscience, with no haunting spectres of remorse, or even of sorrow, to enable him to enjoy the companionship of these black robed figures with uplifted hands and disheveled hair. Yet in storm or sunshine, by day or by night, no tree was ever more individual, or more alluring, than the Monterey pine, and no grove ever had greater charm than that which fringes the beautiful bay, whose first navigators, nearly three hundred years ago, gazing with delight upon the verdure crowned cliffs, named them "Monterey," the King's wood—a fit domain, indeed, for a true king.

(Mrs. Field's rendering of Monterey into English, as "King's wood," seems incorrect, but is not. The word—mons—in Latin means a mountain, or elevation, but in Spanish "mon-te" has the added signification of a wood or forest, and Monterey is a Spanish word.—J. G. L.)

KNOB-CONE PINE.

No. 17. *Pinus Tuberculata*, Gordon.—Knob-Cone Pine, Sun-loving Pine.

Travelers in the but recent stage-coaching days of Northern California, who were whirled along the gorge of the clear, upper Sacramento, winding in and out about the spread toes of the foothills of the Sierra, may have noticed what is now clearly observed from the car windows of the railway—long frettings or fringes of small, slender, close set pine trees decorating with light-green banners the copings of the rounded mountains, especially

No. 15.—(bis.) *Pinus Torreyana*, Parry.—Torrey Pine. Prostrate on the slope towards the ocean. Bluffs at del Mar, 20 miles north of San Diego.



SPITTON & RICH. S. P.

on the east side of the river, and extending from the locality of the present town of Redding to the immediate slopes of Shasta.

These long fringes, and in places more compact patches of trees, compose the headquarters of the curious KNOB-CONE PINE, associated in places with YELLOW PINE, GRAY-LEAF and SUGAR PINE, but always to be distinguished from them at sight on account of its small size when coming into bearing, as well as by its peculiar, sun-exposed position.

Its first near neighbor, while yet in sight of the floor of the Sacramento Valley, is the round-crowned, solitary, dwarfed GRAY-LEAF PINE; farther up on the sides of the sloping hills, just below the KNOB-CONES, are seen the dark-green spires of small YELLOW PINES, but the little KNOB-CONE must climb to the upper tables, elevated 3,000-6,000 feet, before it intrudes upon the severe, majestic presence of the gigantic SUGAR PINE.

In the lower foothills often a solitary sprawling-branched tree, or rarely a small group of them, has fallen from or been torn away from the copings and precipitated to the nearly level intervalles along the river's course; but more frequently a sturdy individual clings tenaciously to a friendly rock jutting out of the mountain side.

These waywards or outcasts, as the case may be, are far from being unfortunates, so far as appearances go, for no trees display more greenness than they, nor more whorls of shining cones circling body and limbs.

These isolated trees or small groups of generally round-headed specimens, being nearest the usual line of travel, have generally been the most observed by the thoughtful traveler, and he often carries away a more or less incorrect idea of the true, normal habit of this tree.

In favored situations the KNOB-CONE forms quite extensive and exclusive forest areas, swarming so thickly upon the locality as to render them slim and tall, sometimes no larger than a walking stick, but even then closely and regularly studded from base to apex with whorls of long, narrow, curved strongly declined, leather-brown cones.

Trees in this last condition have won for the species the inappropriate appellation of "SCRUB PINE," but in many localities I have measured trees that were 100-150 feet high and 2-4 in diameter, with full-fruited, out-reaching limbs.

The striking peculiarity of this pine, one that arrests immediate attention at sight, is the presence of all its yearly crops of cones, the oldest gray and weather-worn, the youngest shining with yellowish green luster. They seem never to fall away or to open at maturity, naturally, yet I have occasionally found a cone upon a peculiarly exposed, lower part of a trunk with its long, strap-shaped, brown scales turned stiffly backward, releasing the scattered seeds.

This persistence of cone, most marked in the trio to which KNOB-CONE belongs, coupled also with the firm coherence of their scales for an indefinite length of time, is an important and very suggestive fact, for it is connected doubtless with the better propagation, if not the very existence, of these species. It is found that the seeds in these long-closed cones are always in good vital condition, however old the cones.

Dr. Engelmann records: "Seeds of closed cones two to eight years old when I collected them, and then kept four years in a hot garret, germinated freely with Professor Sargent of the Arnold Arboretum, at Cambridge."

As stated, rarely is a cone found open, and consequently its seeds cast out, yet the traveler may find whole groves with their cones opened throughout the trees, but this phenomenon is only seen where forest fires have swept through the groves, leaving only blackened trunks and leafless branches, while beneath, on the cleared ground, may be seen hosts of seedling pines

bravely lifting their little whorls of cotyledons to view, and declaring not only that this species of tree shall be its own survivor, but also that it may extend its domain over other territory thus cleared of trees which have departed, leaving no sign.

So we may expect that though the improvident or wanton conduct of man, while it destroys by fire the noble SUGAR and YELLOW PINES of our vast forests, yet shall it not compass the extermination of *all* the family of pines, for, here and there, well distributed over the Coast and Sierra Mountains, this cunning little provident tree, fighting now for room to stand upon, and crowding close together for greater strength, shall, after long waiting and at last fire-killed, triumphantly unlock its mysterious caskets of stored life-germs and scatter them with sailing wings on the wind to reforest the mountains indeed, but with a species of pine at present development, almost worthless to man.

PRICKLE-CONE PINE.

No. 18. Pinus muricata, Don.—Prickle-Cone Pine, Swamp Pine.

The PRICKLE-CONE PINE is a peculiar species, with one exception (*P. contorta*), more than all others loving the low coast swamps of our State.

Its headquarters of development are just south of Cape Mendocino, on the Sonoma coast, from whence it extends southward to Point Pinos and the Santa Lucia Mountains. It was the farthestmost outlying dwarfed specimens of this swamp pine, and not the large typical form, that Coulter discovered, in 1831, on the mountains near San Luis Obispo. In that far southern and consequently warm region, a comparatively cool climate agreeable to this coast-loving tree could only be attained by finding an elevated swamp, and such was the locality discovered by Dr. Coulter.

Don's description of Coulter's discovery reads: "Discovered by Dr. Coulter at San Luis Obispo, in latitude 35 degrees, altitude 3,000 feet, and 10 miles from the sea. Trees straight, stunted, not exceeding 40 feet high. Cones smallest of the section to which it belongs (*insignis, Sabiniana, Coulteri*, etc.), and remarkable for the very great development of the scales at their external base."

Hartweg, fifteen years later (1846), found "a small grove about a half mile square on Point Pinos, about 2 miles from the sea." This locality being so small, has rarely been found since. Last month (September, 1888) Mr. F. N. Gomez, an early and enthusiastic resident of Point Pinos, at my urgent request made diligent search for this small spot in the dense forest and with success, forwarding duly to our herbarium good specimens, undoubtedly gathered from Hartweg's locality, and determining that it is about 200 feet above the sea.

In Marin County, at Tomales Point, it approaches the sea to within a few hundred rods, growing "in the most sterile soil."

Further north, in the peat bogs of the Sonoma coast, it reaches its highest development, attaining often 80-150 feet, with proportionate expansion and vigor.

There is little of special importance, aside from the natural history of this species, to mention, after we have discussed, as in preceding pages, the peculiarities of its two fellows of the persistent and long-closed cone group. It might suffice to say that this tree differs in appearance from the others, mainly in its low, wet, marsh-loving habit, its small egg-shaped cones, with permanent prickles, and its leaves always in pairs.

One point connected with its development may be brought out in a few words, and first by comparisons.

We have shown that the elder member of this warrior band, the MONTEREY Pine, is now busied in overrunning the but lately wind-blown sand-hills of Point Pinos, battling right and left with the obstacles of its environment, and giving quarters only to another ocean battling tree of the oak family—the evergreen FIELD OAK. This encroachment upon and occupation of the ocean's dumpage ground is simulated at another point on the coast by a similarly aggressive tree—the TORREY Pine.

Also, we have traced the natural history of another associate—the KNOB-CONE Pine—especially in its adaptations of means to needs in the propagation of its species, and we intimated that the species disseminated here and there over both coast mountains and Sierra foothills, on the sunniest, driest, most exposed copings of mountains, where most exposed, also, to forest fires, stand the best chance, ultimately, not only to enlarge their area of occupation, but eventually to conquer all other vegetation and fall heir to the entire middle forest region.

The DWARF-CONE Pines, as shown in early paragraphs, seem adapting themselves to the holding of the alpine plateaus and passes of the Sierra against all contestants for all time; so there is but one kingdom left to be conquered—the low, maritime region observed to be menaced in a pronounced manner by one member of this trio of conquerors. The Redwood (*Sequoia sempervirens*) of limited range along the red sandstone belt, is making a brave fight for posterity, by throwing out suckers that become trees from adventitious buds in the stumps and roots.

But one other tree of the low coast region stands any chance of escape from the destruction that marks the presence of civilized man, and that is this PRICKLE-CONE Pine under discussion. This remarkable tree, with its long-persistent and long-closed fruit, which, like its congeners, is only released upon the most favorable conditions for propagation, is well distributed along the coast at lookout, picket stations, ready to press in upon uncovered ground; and so, from the snow-covered peaks of the Sierra to the wave-washed shores of the sea, whatever may become of the present noble, enrobing, supremely valuable forests, the entire pine family mostly forming them may not be cut off utterly, for one type of development—the strategical Closed-Cone, at present insignificant pines—thrive best under the very conditions that are destroying the others.

VERNACULAR NAMES OF PINES.

In this closing paragraph another topic should be discussed—the popular or vernacular names. In the baptism of trees in our vernacular the matter is often left to the incompetent or careless observer, who, perchance, happens to reside near or among them. As might be expected, therefore, inappropriate, improper, and even decidedly bad names are often given them—nicknames, we might call them—which, as we come to know the trees better—their qualities, uses, and localities—we should correct by the substitution and persistent use of appropriate ones. The name, frequently met with in descriptions, of "Bull Pine" has been foisted into our pine literature by impudence or thoughtlessness, and the authorities have, strangely enough, accepted and repeated the epithet, despite its indiscriminate application to at least a dozen kinds of pine trees. In the preceding papers it will be noticed that inappropriate names have scarcely been mentioned, never admitted to place as present appellations.

"Bishop Pine," for our PRICKLE-CONE, swamp-loving species, is a very inappropriate name. What is its significance? For what reason applied? Merely and solely because the little outlying dwarfed specimens of this species first discovered were in the vicinity of San Luis Obispo.

"Soledad Pine," for our TORREY PINE, is another misnomer, inasmuch as the trees are found as well in the San Dieguito Cañon as in that of Soledad. The eminent propriety of changing this name to TORREY PINE is further enforced by the late discovery of the species on one of the Channel Islands, so that it is no longer in any sense the "Soledad Pine."

In the foregoing "List" and in the "Extended Descriptions," I have generally given two vernacular names to each species, one based, usually, on characters, the other on habitat or place of growth. By one or the other every tree cannot fail to be detected by the common observer, especially if he considers the other previous classifications leading up to it.

Of the importance of early selecting and thoroughly establishing appropriate popular names, I need address no words to those who have been confused by a half dozen misnomers for the same kind of tree. I remember when Dr. Engelmann was last on this coast the vernacular names gave him great annoyance, and it was proposed to him that a conference of botanists and lumbermen should examine and settle the popular nomenclature; but, owing to want of time and unity of action, the important work was left undone.

INVESTIGATION OF YELLOW PINE (*Pinus ponderosa*) AND BLACK PINE (*P. Jeffreyi*).

SOLICITING INFORMATION.

Having briefly described in the proper place the Broken-Cone Pines—*ponderosa* and *Jeffreyi*—and indicated the principal forms or varieties of them, in view of the fact that they comprise the greater part of the forests of the Pacific Slope, it was thought best to devote especial and extended inquiry to them in order to obtain all possible information concerning their history, qualities, uses, values, etc., the damages they sustain from enemies of every sort, and from fire and other elements.

Consequently, early in the present season (1888) there was prepared and distributed to mill owners and lumber dealers throughout the States of California, Oregon, and Nevada, and the Territories of Washington, Idaho, Utah, Arizona, and New Mexico, two hundred copies of the following "Circular of Inquiry," which, as being the first of a contemplated series, was denominated—

CIRCULAR "A."

INVESTIGATION OF TIMBER TREES—PACIFIC SLOPE.

To ———:

DEAR SIR: The California State Board of Forestry is engaged in a systematic investigation of the forests of the State, with a view to the procurement of useful information for wide dissemination in the hope of securing proper legislation for the protection or renewal of our forests.

Having been appointed Botanist for the California State Board of Forestry, for the purpose of investigating and reporting upon the pines of the Pacific Coast, especially *Pinus ponderosa* and *Pinus Jeffreyi*, the undersigned desires the assistance of all persons interested in forests or their products to aid him in making as full and correct a report as possible upon the subject in the limited time allowed for the work.

The instructions embodied in my commission specify that "the report shall comprise an exhaustive account of the geographical and local distribution, the estimated amount and condition of present supplies, the rate of consumption, the value, qualities, and uses of their wood, their habitat (place of natural growth), their biology (life history or conditions of growth), their chances for natural reproduction, the dangers threatening their extinction," etc.

This special report must be submitted to the Forestry Board before the end of the fiscal year, but other investigations and reports will be made annually until all the timber trees of the Pacific Slope are treated of—a work that may require several years—hence, any information concerning other trees will be gladly received and filed until needed.

DESCRIPTIONS.

To aid in the collection of information a few words descriptive of the trees in question may be necessary.

Most of the pines of this Pacific region are "pitch pines," that is: they belong to the large number of pines whose wood-cells contain more or less pitch or resin, rendering the timber harder, heavier, and less liable to decay than the other smaller class of pines of which the "sugar pine" of the Pacific Slope and the "white pine" of Michigan are noted examples.

The two species of pine distinguished botanically in this circular as *Pinus ponderosa* and *Pinus jeffreyi* are those familiar trees called characteristically by lumbermen "Yellow Pine," "Black Pine," "Sap Pine," "Swamp Pine," "Bull Pine," etc.

They comprise the greater part of the extensive forests of the Rocky Mountains, the Sierra Nevada, and portions of the coast ranges, with the headquarters of greatest development in the Sierra Nevada.

The pitch pines may be readily distinguished from the white or sugar pines, which often accompany them, by observing characters of the limbs, the cones, and the leaves; viz.:

The limbs of the sugar pine are mostly near the top of the tree, and are few, large, long, out-reaching, and bearing very large, long cones—12 to 20 inches long—depending from the ends of the limbs; while the leaves are always short—about 3 inches long—and in bundles of fives.

On the contrary the limbs of the pitch pines under consideration are more numerous, often scattered along the trunk except in forests, where trees usually trim themselves to a great height. Any of the limbs may bear the cones which are smaller, 4 to 8 inches long, conical, pointing outward from the limbs in any direction and with prickly-bearing scales. When they fall away from the tree a portion of the base of the cone remains fast to the branch. The leaves are thicker, longer—often 8 to 12 inches long—and in bundles of threes.

The two species of pitch pine, which for convenience we will call Yellow Pine and Black Pine, are distinguished from each other by the following characters:

"Yellow Pine:" Often tall, 200 to 300 feet high, and 12 to 15 feet in diameter, with very thick, yellowish bark deeply and irregularly furrowed into large plates; the sap-wood very thick, 100 to 200 rings, almost white, the heart-wood light red, usually hard and heavy, but varying greatly in these qualities.

The Yellow Pines are distributed throughout the region described, and furnish the principal lumber of Central California and Nevada, Eastern Washington and Oregon, Western Montana and Idaho, and the greater part of New Mexico, Arizona, and Western Texas, with the near prospect of extensive consumption in regions farther eastward, owing to the gradual exhaustion of the Great Lake forests.

"Black Pine:" Smaller, 100 to 200 feet high, with more symmetrical, rounded or conical head, finer cleft and darker bark, larger cones and glaucous (white powdered) branchlets and leaves. The branches when freshly bruised give off an odor resembling oil of orange.

The sap-wood is usually yellowish white, the heart-wood coarser grained and usually lighter than the other pine.

The Black Pine is found exclusively on the slopes of the Sierra Nevada, especially on the eastern side.

With these descriptions in mind, there can be no mistake in distinguishing these trees from each other.

QUESTIONS.

Referring, if necessary, to the foregoing descriptions, please return answers to the following double series of questions, using other paper where the space left for answers is insufficient.

Economic.

1. Are the Yellow Pine and the Black Pine both found in your immediate vicinity, or within your county? If so, in either case, in what ratio to each other; also to other timber trees? Answer: ———.

2. Does the Yellow Pine described only grow in your vicinity, *i. e.*, unaccompanied by the other, the Black Pine? If so, in what ratio to other trees? Answer: ———.

3. What is the condition of the trees, *i. e.*, are they too small for lumber purposes, or are they large enough but untouched; or are they being removed for farming purposes, to make room for crops or used for fencing, for fuel, coal making, etc.; or are they being manufactured into lumber? If the latter, state what kinds of lumber, as building

material, railroad ties, mining timbers, bridge timber, shingles, laths, etc. Answer: —

4. What is the output of lumber from the mills at your station, or in your county, annually? Give in feet, board measure, amount for 1887, and the value. Answer: —

5. In the cutting of logs at your station, or in your county, is there any limit to the size taken? If so, what is the least diameter or girth? And what is the average number of logs required for making 1,000 feet of lumber. Answer: —

6. In regard to durability of the pitch pines, how do they compare with other trees for resisting decay when used as fence boards? As fence posts? As weather boarding? As shingles? As railroad ties? Answer: —

7. Has the forest at your station or in your county been injured by fires either accidentally, carelessly, or purposely? If damaged, how greatly, during a series of years past; also during the year 1887? Give estimates in acreage of square miles or in ratio to timber left. Answer: —

8. Are the forest trees of your vicinity injured by attacks of insects, or by vegetable parasites, such as the mistletoe? If so, to what extent? Answer: —

9. Where the original forest in your vicinity is removed, what trees, if any, come in? Give age and height of largest trees, and a conjecture as to when they will be large enough for lumber use. Answer: —

10. What other facts or suggestions of interest can you give bearing on the subject of forests and their products? Answer: —

Biological.

11. In regard to growth of the pitch pines under investigation, at your station or in your county, what is the average height of trees? What is the average number of rings to the first linear foot of diameter, counting from the heart outward? The second foot? Third? etc., and what is the largest diameter or circumference you have noted, and the height of the same tree? Answer: —

12. What differences have you noticed concerning tree growth, depending perhaps upon differences of elevation? Or of inclination, *i. e.*, on slopes facing northward, eastward, southward, or westward? Answer: —

13. According to your observation, what is the altitude above the sea level for the greatest development, the most robust growth of the pitch pines? And what is the altitude of their extreme upper limit? The lower limit? Answer: —

14. What is the annual amount of rainfall (or of melted snow) at your station, or nearest recorded locality? And during which 30 days does the greatest precipitation occur? Answer: —

15. At what time does the tree flower, *i. e.*, when is the pollen disseminated? Detected by the air under the trees, being sometimes filled with yellow dust. Answer: —

16. Do the cones ripen and fall equally abundant one year with another? Or only on alternate years? And when was the most prolific season you have noticed? Answer: —

17. There being great diversity in the size of cones, what are the extremes in length of mature cones you have noticed? And what the locality, the elevation, exposure, or other conditions of the trees bearing the largest cones? Ditto of those bearing the smallest? (In answering these questions be careful not to confound the two species described.) Answer: —

18. Has the forest in your vicinity ever suffered from the effects of floods, or hot winds, tornadoes, or avalanches? If by either, give date and estimated damage. Answer: —

19. Are the trees injuriously inclined by prevailing winds, or by weight of snow? Or are any considerable number of them dying at the top, or throughout, from natural causes? Give estimate of damages. Answer: —

20. What other facts of interest can you give concerning the growth or life history of the pitch pines? Answer: —

It is obviously of great importance that as full and accurate statements as possible shall be made, but where exact figures or data are not attainable, careful estimates may be given.

The names of parties reporting information need not necessarily be published in connection with their statements, but only condensed reports from the various stations, towns, or counties of the States and Territories.

It is not deemed necessary to urge the importance of the investigations herein contemplated; hence, your early and earnest coöperation is hopefully and respectfully solicited.

Reimbursement for expenses of stationery, stamps, etc., will be made if desired.

Address all reports or inquiries to—

J. G. LEMMON,
Botanist for the Board of Forestry,
California Hall, Clay Street, Oakland, California.

N. B.—Latest date for reception of reports, August 10, 1888.

RESPONSES.

Some of the responses are nearly complete and quite satisfactory. Others only convey meager information.

Following are a selection of characteristic responses:

Mr. Wm. B. Tiffany, Truckee, California, Agent of the Sierra Nevada Wood and Lumber Company, reports:

"I have endeavored to answer most of your questions, but I have great difficulty in distinguishing the difference between the yellow and the black pine sometimes.

Economical.

"First question—Are the yellow and black pine both found in your vicinity, etc.? Answer—Yes. Both are found abundantly in the eastern portions of El Dorado, Placer, Nevada, Sierra, and Plumas Counties of California. The ratio of each to the other varies. In some localities the growth is nearly all yellow pine, while in tracts adjoining perhaps all is black pine, but often they are mixed. Variety of soil, varying slopes, and different conditions of moisture cause a different growth of trees. The yellow pine usually grows upon sunny slopes, or upon flat bench land, preference being given always to a warm, dry soil.

"The black pine grows and thrives more upon moist land around springs and meadows, and upon north slopes adjoining groves of or intermingled with white fir (*Abies concolor*) or balsam. Black pine usually predominates on a coarse granitic soil, where the surface is uneven or rolling. Both the yellow and black are distributed about equally over the district of country above named, as to number of trees, but with reference to value and accessibility, the yellow far exceeds the black pine.

"In appearance the yellow pine is large and tall, of a spire or steeple shape. The bark is thin and of a red-brown color, furrowed into segments of large or small size and of great irregularity.

"The sap-wood is generally thin and it can be easily all removed from the heart-wood at the mill. The sap on large trees is not often more than 2 to 4 inches thick.

"The heart-wood is often very light and dry when first sawed from the tree; the color is of a yellowish cast. It is often soft and of greater value for clear lumber than sugar pine. It is generally free from pitch streaks and imperfect spots.

"The black pine does not grow as large as the yellow, the growth is more in groups and upon rocky slopes. The bark is thick with deep, irregular furrows, close together longitudinally; the sap-wood is very thick and heavy, in fact trees of two and three feet in thickness are all sap-wood, except perhaps a few inches in the center, which is generally of rather poor quality.

"Third Question—What is the size, condition, etc., and what uses are made of the trees? Answer—Yellow pines are of a good average size for lumber, from 2 to 8 feet in diameter. Black, from 1 to 5. Both are being manufactured into lumber on the Truckee River, and at Lake Tahoe, also at many other locations throughout the region described.

"All kind of building lumber, mining timbers, railroad ties, bridge timbers, shingles, laths, and packing boxes are made in this region; also much is used for fencing, fuel, and coal making.

"Fourth Question—What is the output of lumber from the mills at your station, or in your county, annually? Answer—The output of lumber on the Truckee River from the Counties of Placer, Nevada, and Sierra, State of California, and of Washoe County, in the State of Nevada, is about forty

millions of feet annually. Of this two thirds is pine, the rest white and red fir. The value of common lumber is from \$8 to \$12 per thousand, and from \$15 to \$35 for clear lumber.

"Fifth Question—In the cutting of logs at your station, is there any limit to the size taken, etc.? Answer—On the Truckee River logs are cut as small as 10 inches in diameter, elsewhere not so small logs are taken.

The average number of logs required to make a thousand feet is $2\frac{1}{2}$ to 3 logs; often 2 logs will make a thousand, rarely one will yield that amount.

"Sixth Question—In regard to the durability of pitch pines, how do they compare with other trees, etc.? Answer—Pitch pine lumber is durable when it does not come in contact with the earth. For fence posts and railroad ties it is not so lasting as cedar (*Libocedrus decurrens*), and redwood (*Sequoia sempervirens*), and will decay in from 3 to 10 years. It is not much used for these purposes.

"Seventh Question—Has the forest at your station been injured by fires, etc.? Answer—The forest in this region has been greatly damaged in the past, and in some localities 2 trees out of 4 have to be cut off at the butt on account of injury by fire.

"The box business, however, which is extensively prosecuted at Truckee and elsewhere, is overcoming this former loss, and at many of the mills nearly the whole tree is sawed up and utilized for box lumber.

"The fires have been set in years past by Indians to drive or herd their game. Sheepherders set many fires wantonly, also campers, and travelers generally.

"Railroad engines occasionally fire the dry leaves and weeds along their lines, which escape to the woods, but generally much vigilance is used on the part of workmen to prevent such accidents. Rarely lightning ignites a tree, at least certain forest fires are reported to be caused by lightning.

"As the timber lands pass into the possession of private individuals the owners generally make some effort to protect the forest. While the title remains in the Government no one seems to care if the forests do burn over.

"In certain localities fires were very destructive over large areas in the year 1887. In one place several sections (mile-square plats) were burned by a single fire in one night. Seven or eight years ago a fire that started near Verdi, Nevada, from a sheep camp, moved westward for several weeks, destroying over seven thousand acres of excellent timber.

"Eighth Question—Are the forest trees of your vicinity injured by attacks of insects or other animals, or by parasites? Answer—But slightly by mistletoe and not at all, that I can remember, by insects. The dry summers and cold, snowy winters must prevent. Porcupines girdle a great many young trees in winter, when the snows are deep, to obtain food.

"Ninth Question—Where the original forest is removed, what trees, if any, come in, etc.? Answer—A new growth of the same kind of trees come in. It must be that seeds find only occasional seasons favorable to germination, as young groves seem to consist of trees of the same age. In Ormsby and Washoe Counties of Nevada, where the timber was all cut off and the ground burned over in 1866 (twenty-four years ago), a growth of very fine trees is found now, fifteen to twenty feet high, and many of them one foot in diameter. The increase of some of the thriftiest is one inch annually in diameter and two feet in height.

"Upon Galena Flat, in Washoe County, T. 17 N., R. 19 E., M. D. M., there are some three thousand or four thousand acres of fine pine trees twelve to twenty feet high and four to twelve inches thick, grown in twenty years.



No. 16.—*Pinus insignis*, Dougl.—Monterey Pine, Pacific Grove, Point Pinos, near Monterey.



"It happens that in the region last described sheep are herded through the pines in the spring season, eating all the herbs and trampling the pine leaves into the moistened earth to a depth of two or three inches. This process prevents fires from occurring anywhere in all this young forest, and, perhaps, it also improves the conditions somewhat for the vigorous growth seen.

Biological.

"Eleventh Question—What is the average height of trees, diameter, etc.? Answer—The average height of trees in the district named is 100 to 150 feet. The greatest diameter I have seen was 7 or 8 feet, those trees being about 150 feet high.

"Twelfth Question—No answer.

"Thirteenth Question—What is the altitude above sea level for the greatest development, etc.? Answer—Pines thrive best at an altitude of 5,000 to 6,500 feet at this station. Their extreme upper limit must be at about 7,000 feet, and the lower limit not far from 4,500 feet.

"Fourteenth and fifteenth questions unanswered.

"Sixteenth Question—Do the cones ripen equally abundant, one year with another, etc.? Answer—There is a vast difference in years for the production of cones and seed. Sometimes several seasons will pass before seeds that contain good kernels will be found; then, perhaps, a season comes in which the ground under the trees will be covered with cones and sprinkled thickly with plump seeds, at which seasons the squirrels and chipmunks gather the seeds, and even the cones, very industriously, burying them or hiding them away from sight. Such a prolific year occurred five or six years ago; seeds then could be scooped by handfuls from the ground.

"Seventeenth Question—What are the extreme lengths of cones you have noticed, etc.? Answer—Two or 3 inches long for the yellow pine, with the thickest and whitest bark, and 6 to 8 inches for the cones of the black pine, with thinner, darker bark.

"Eighteenth Question—Has the forest suffered from meteoric causes, etc.? Answer—In very wet seasons, if hard winds prevail, a great many trees are blown down in certain passes, or along the banks of lakes, or the sides of valleys.

"Nineteenth Question—Are the trees dying naturally; if so, the cause, etc.? Answer—Many trees are dying in scattered situations through the forest. No assignable reason for it, perhaps old age.

"Twentieth Question—What other facts of interest can you give, etc.? Answer—The Sierra Nevada Wood and Lumber Company own over 100,000 acres, to wit: In Sierra County, 25,000 acres; in Nevada, 11,000 acres; in Placer County, 12,000 acres; in Washoe, stripped of trees, 35,000 acres; in Douglas, stripped mostly, 8,000 acres. While we strive to prevent the waste or destruction of timber, we do not share the fears of some concerning the loss of present forests, and we hold our lands, untouched or stripped, at about the same valuation.

"WM. B. TIFFANY,
"Agent S. N. W. & L. Co.

"TRUCKEE, September, 1888."

C. F. Sonne, bookkeeper for the Truckee Lumber Company, reports a few additional facts from that interesting region, all statistical:

"The only firms here now who cut logs to any great extent are the Truckee Lumber Company, cutting last year (1887) about 5,000,000 feet of logs—of this one half is white and red fir, the rest pine, but I cannot

get at the ratio of yellow or black kinds; the Pacific Lumber and Wood Company cut last year (1887) 5,000,000 feet, nearly all pine—of this probably one third black pine; George Schafer cut last year 8,000,000 feet, one half of it fir and one tenth of the whole black pine—say, 500,000 black and 3,500,000 of yellow pine; the Ellen Mill Company cut a large quantity, and the Richardson Brothers, but I cannot get the figures.”

Circulars and urgent letters to all of these parties were pleasantly received, and promises of replies returned, but no responses were ever made, for various reasons, mostly want of time.

H. K. Turner, representing the Turner Bros. Sawmill at Sierra Valley, Sierra County, California, reports:

Answer to No. 1: Both in about equal quantities; perhaps the black pine predominates. They comprise the larger portion of the forest growth here.

Answer to No. 3: Generally of good size, and are being cut for all domestic purposes, building lumber, fencing, etc.

Answer to No. 4: About 3,000,000 feet, valued at \$30,000.

Answer to No. 5: Seldom less than 12 inches is taken. About 2 logs yield 1,000 feet; a fair estimate.

Answer to No. 6: As boards pine lumber is most desirable. Cedar (*Libocedrus decurrens*) is used here, generally, for fence posts; sugar pine for shingles; no railroad ties manufactured here yet. (Twenty-five miles from the line of the C. P. R. R.)

Answer to No. 7: Never has been much injured by fire.

Answer to No. 9: Same as original growth. Some trees 200 feet high, and perhaps 500 years old. Seldom is a tree cut for lumber that is less than 100 years old.

Answer to No. 11: Average height about 175 feet. Trees 8 feet in diameter and 200 feet high are the largest I have noticed; did not count rings; think about 250 years old.

Answer to No. 12: There is not much difference in size or appearance of trees on different slopes, etc., but the northward slopes produce the best lumber.

Answer to No. 13: From 3,000 to 5,000 feet is the best altitude for development. Upper limit about 6,500 feet; cannot give the lowest limit.

Answer to No. 16: The cone and seed product varies greatly; cannot say when or why.

Answer to No. 17: Have not recorded any observations; unable to answer.

J. D. Keefer & Co., Nord, Butte County, California, report:

1. Yes; both yellow and black pine are about equally abundant here, but as we go higher up in the mountains the yellow pine is more numerous, and it also increases in size to the timber limit.

2. We have yellow, black, and sugar pine, spruce, cedar, fir, red or black oak. The yellow and black pine compose two thirds of the forest.

3. Trees generally large enough for lumber. Very few are being removed or farming purposes, none for coal-making, or for fuel. Fencing, lumber, building, bridge timber, etc. No railroad ties, lath, nor shingles, or mining timber.

4. About 1,000,000 feet for this station; cannot say for the county.

5. Fifteen inches at the small end. About 3 logs to the 1,000 feet.

6. For fence boards, weather boarding, or rustic siding, or shingles they are No. 1; for railroad ties I can't say. Not good for fence posts; decay too soon.

7. No damage has ever been done, to my knowledge, to growing trees, that is, during the past 18 years.

8. Very slightly; hardly noticeable.

9. Sugar pine, yellow and black, and fir. From 18 to 22 years; height, from 50 to 120 feet. Some of them will make lumber within 10 years.

10. As fast as the timber is cut down, or burned off, young trees spring up and take their place. The young trees grow very rapidly, in 6 to 10 years obtaining a height of 20 to 35 feet. It seems to us impossible to destroy a pine forest, as long as fire is kept out.

11. I would say 150 feet. First foot diameter, 32 rings; second, 51 rings; third, 68; fourth, 74 rings. Largest diameter I have measured, 7 feet 8 inches, 180 feet high, 563 rings from heart to bark.

12. On slopes facing northward or northwest the trees grow more rapidly, are taller, have less body limbs, make better lumber, shingles, or shakes.

13. About 3,000 feet; (b) 8,000 feet; (c) 1,500 feet.

14. I have no means of measuring the rainfall. Cannot answer.

15. In May of each year.

16. No. Only every third year. In 1877 and in 1883; this year promises a good crop, but not so abundant as in 1883.

17. I cannot at this time answer, but will make investigations for the future. Write to me again.

18. No. From neither. We have no hot winds, and seldom winds heavy enough to damage trees appreciably.

19. No damage from wind or snow. Occasionally a tree may be seen dead on top, but I am ignorant of the cause.

20. None other at present, owing to limited time.

J. W. Snodgrass, La Grande, Union County, in the northeast corner of Oregon, reports:

1. Yes. Both are found here abundantly.

3. They are large enough for sawing; timber all in the mountains.

4. At one station probably 2,000,000 feet; in the county, probably 5,000,000 feet.

5. They must be 14 inches or over, as they run about 3 logs the 1,000 feet.

6. They are the best for all purposes we have.

7. Not to any great extent. Some years past some damage was done carelessly by Indians.

8. No. No damage to report.

9. The same kinds come in, namely, pine, tamarack (*Pinus Murrayana*) and fir. Cannot say when will do to use.

10. I would urge the necessity of more thorough efforts to prevent fires.

11. From 50 to 100 feet; the largest about 5 feet through.

12. More timber grows on the eastern than on the western slopes.

13. At our station about 3,000 feet. Upper limit, 4,300 feet. Lower, 2,700 feet.

14. Never kept a record. Time mostly in March.

15, 16, and 17. Not noticed in these reports.

19. Some are dying, probably 5 per cent.

L. C. Seaton, writing from Teanoway Valley, in Kittitass County, Washington Territory, in the west part of the country just east of the Cascade Mountains, at an altitude of 1,600 feet, in a valley of about 128,000 acres of good agricultural lands, reports:

1. Yes; both kinds in this vicinity in great abundance; about equal, comprising three quarters of the forest.
2. Yellow pine accompanied by the black pine.
3. The valley is just settling up, many mills being erected. Some will cut 100,000 feet per day. All sizes from 6 inches to 6 feet are cut and made into lumber.
4. About 500,000 feet, value \$5,000.
5. Least diameter 14-16 inches; 3 logs 16-20 feet long to the 1,000 feet.
6. Our pine is quite durable; is used by railroad companies for ties, but not so durable as red fir (*Abies amabilis*).
7. Heavy fires are frequent and very destructive. During the year 1885 perhaps one tenth of the timber in this valley was destroyed, but the average would not be so great one year with another.
8. None at all.
9. It grows up to pine again. All ages and heights. It takes a pine here 100 years to grow 12 inches in diameter. [This must be an error.]
10. About one fourth of the timber here is red fir. Higher up in the mountains there is considerable cedar. Cottonwood is abundant along the streams, and also larch in the mountains.
11. Average height about 100 feet in this valley, but in the mountains it attains the height of 200 or 300 feet, with 100 rings to the foot. Largest diameter seen 10 feet.
12. The greatest growth is in the highest elevations, not much difference in slopes.
13. Greatest development seems to be at 3,000 feet. Highest limit unknown, lowest about 1,500 feet.
14. Annual rainfall about 16 inches, melted snow about 24 inches. Greatest amount of rain in November, snow in January.
15. Fore part of June.
16. Two years ago (1886) there was an abundance of cones, last year but few. Prospects fair for many this season (1888).
17. Have not paid much attention. All here seem to be of about same size, 4 inches long.
18. No damages.
19. Not injured by wind or snow. Some few, perhaps 1 per cent, from natural causes unknown.
20. No time for more facts.

RENEWAL OF PINES.

The remark is often heard when discussing forests and forest products, that they are being exhausted, that few young trees are coming on, and that the entire mountain regions of the West will in a few generations be denuded and destroyed. During my somewhat extensive explorations of these mountains for twenty years past, I have given especial attention to this subject, and I do not share these opinions, but I believe, rather, that the forest is being amply renewed, and usually, by the same trees.

Circumscribing often a certain area, I have counted the stumps thereon where trees have been removed, then counted the young trees, those that have a robust appearance, evidently beyond danger of being choked off as weaklings, and usually the number of younglings exceeded the stumps.

This, of course, alludes to examinations where forest fires have not prevailed annually. Forest fires are the great scourge of the West. Where they prevail the most painful desolation is seen. We witnessed last season a fire in Sierra County, which, raging for several days, laid bare two thousand acres of very valuable timber, and, of course, killed the young trees.

In a few instances it should be stated to the credit of certain lumber owners, that pains have been taken to clear off by fire the tree tops left where lumber and wood have been completely removed from the ground. Such a region is seen in nearly all the space between Lake Tahoe and the Carson Valley—say twenty by twelve miles. Some twenty-two years ago this land was speedily stripped by the use of flumes, down which the mining timbers, other lumber, and the wood were cheaply transported fifteen to twenty miles over a grade so steep that it would be impossible for locomotives to make the ascent, even by a road twice as long.

Having stripped the valuable lumber off, fire was systematically used to clear the brush away, and now over all this space an abundant young growth is seen, of both the yellow and black pine, ten to twenty feet high and ten to fourteen inches in diameter.

Above Donner Lake, where a flat, rocky valley was cleared of trees twenty to twenty-four years ago of principally *Pinus Murrayana*, or "Tamarack Pine," there is now no want of trees, in fact, they are many times thicker than the stumps among them.

It is true, the invaluable forests of redwoods in the coast mountains, composed of trees requiring many centuries for their growth, are being fast removed by this generation. Only the wisest legislation could prevent this calamity, for all the interests of gain and convenience are arrayed against any efforts at rescue.

But the young trees springing up so generally in the track of the devastating ax and saw, are in many places ruthlessly destroyed for trifling purposes. Indulgence annually in Christmas trees by the citizens of San Francisco and the other cities near the redwood belt, causes the sacrifice of thousands of the finest, most robust trees, at 25 to 50 cents apiece.

When Mr. Tiffany conducted us to an embowered dancing-floor near Donner Lake, a hundred feet square, we found it thickly surrounded with young pine trees, cut and placed there just for ornament, and we could but heartily join him in his mournful denunciation of the vandalism. Everywhere through the forests may be seen the most wanton destruction perpetrated by tramps, campers, and hunters, whose depredations are not restrained by law in this new country.

In all the agricultural valleys, of which there are many within the forests of the Pacific ranges, the edges of the forests have usually been removed for various reasons, and invariably the trees have tried to restore the wastage. Perseverance in their destruction to maintain cultivated fields is successful, but any neglect is seized upon at once by the negligent cone-bearers to creep into the tracks of their progenitors.

The same remarks may be made concerning the many mining camps of the Sierra. Once the picture of wholesale destruction and the monuments of a merciless greed, the uptorn cañons and mining ditches, the ruined mills and macadamized stage roads, are now overgrown by large trees and kindly concealed.

NATURAL ENEMIES.

ANIMALS.

1. *Porcupines.*

Several animals prey upon trees at different ages of their growth, and in different degrees. The most destructive enemy of pines I have noticed is the Western Porcupine (*Erethizon epixanthus*).

In winter, when deep snows lie on the Sierra, these animals, which do not seem to mind the rigors of the season, come out from their hiding places in rocks, and climbing young trees gnaw off the bark from the smooth inter-nodes near the summit of the trees. Often every limb will be stripped, too, and first bleeding at every pore with pitch for a season, the trees soon die—at the top, at least. Trees are attacked and killed in this way in great numbers in certain sections.

The forests around Sierra Valley, at Webber Lake, around Donner Lake especially, and along the Truckee River to Lake Tahoe are much injured, every tree in some large areas bleeding and dying from being girdled by porcupines.

Mr. Tiffany, whose full report in reply to questions is given in another place, kindly conducted us to Donner Lake, to show us porcupine work in the "Tamarack Pines" of that region. It was a pitiful sight to behold. Hundreds of trees could be counted from any one standpoint, whitened with pitch and dying at the top, or often killed outright.

On the line of the Truckee River scarcely a young tree has escaped these marauders, and in such molested localities as these it is past comprehension that suitable steps have not been taken to destroy these animals. It seems they must have rough, rocky places for their haunts, as the open, smooth country does not show their presence.

2. *Insect Depredators.*

Pine trees and, in fact, all the cone-bearers, are prevented from ripening seed every year by the attacks of insects of several kinds.

Certain kinds attack the buds or the yearling cones, and they wither and fall. Others prey upon the maturing cone, and their larvæ bore through the scales from ovule to ovule, eating out the germs.

The fact that forest trees only produce seed occasionally is mainly due to these causes. A year of full crops favors insect development, which reduces fruit production, by which, in turn, it is itself checked for want of food; so these opposing forces combat, triumph, and retire alternately, and consequently the trees are intermittent in seed-bearing.

VEGETABLE ENEMIES.

Parasites.

Mistletoe.—Several species of pine mistletoe feed upon the cone-bearers, and two species in particular—*Arceuthobium occidentale* and *A. robustum*—attack the forms of yellow and other pines we are investigating. The former may be seen in limited sections throughout both the coast and Sierra Mountains. The latter is said to flourish upon the variety *scopulorum* in the Rocky Mountains.

Except where a young tree is attacked by the pine mistletoe, the destruction of the tree is not severely menaced; but where large masses of this parasite are found, and the limbs are being strangled and killed, of course a deleterious effect is produced upon the tree to the extent of the loss of so much foliage, and consequently the failure of the elaboration of a given quantity of sap.

In several sections of the Sierra forests, and in many more of the Coast Ranges, mistletoe is so abundant that the trees are very appreciably stunted in their growth, many trees that started out vigorously being now stopped and spoiled for timber, and not a few are killed outright.

Fungi.

In the same way as the unseen miasma of the lowland and the microgerms of the crowded metropolis are the most insidious and successful enemies of mankind, so certain microscopic fungi are found to be stealthily preying upon our forests, and, in some localities, to the extent of total destruction to large areas.

One of my correspondents, Eugene Semple, of Vancouver, Washington Territory, writes: "The most valuable tree here is the Yellow Fir (DOUGLAS SPRUCE) which reaches its greatest development in the coast mountains of Oregon and Washington, where it sometimes reaches a diameter of 12 feet and a height of 300 feet. * * I have noticed within the last few years small areas of dead firs occurring so frequently on the mountain sides as to be very conspicuous and of course important. I have made efforts to ascertain the cause, but am still ignorant of it; probably due to ravages of insects."

Mrs. M. A. P. Ames, of Auburn, California, writes: "Our two species of pines—*Sabiniana* and *ponderosa*—are much affected this season, the damages seemingly more and more evident with each passing year by that recently described fungus of Dr. Harkness. It attacks trees of all ages, but especially young ones, forming rings or swellings on the limbs. The *P. Sabiniana* suffers most. Often nearly every tree of a grove will be diseased, and dead ones are seen on every hand."

The two enemies whose work is thus described by my correspondents are types of several fungi that are preying upon our forest trees. The first mentioned has been investigated by Dr. Harkness, President of the California Academy of Sciences, and named by him *Dædalia vorax*. The second was named by another microscopist in his honor, *Peridermium Harknessii*, Moore. This is an orange colored fungus that in the spring months attacks its victims, and we have observed every twig, often several knots on the same one, on a tree attacked. The mycelium of the fungus penetrating to the cambium, the tree at once commences to develop new tissue, either to arrest the invader or to envelop and encyst it. Swelling commences, generally extending all around the limb or young tree, and as the work goes on year after year, the excrescences, breaking the bark, swell to rounded knobs, generally surrounding the part affected, the sap is prevented from reaching beyond, the services of the girdled limbs in elaborating materials for the community are suspended, the limbs become hypertrophied, the struggling tree yields to fate while bravely fighting, and, like Samson, destroys his enemies by his fall.

PINE-SEED HARVESTERS.

Much could be written concerning the work of squirrels in cutting off cones, gnawing the scales therefrom at once to secure the seeds, or storing them in many ways for winter use—but space forbids.

Cross-bills.—During two winters while the writer was residing at Webber Lake, Sierra County, California, at an elevation of nearly seven thousand feet altitude, the snow being fifteen to twenty feet deep, the grove of TAMARACK PINES (*Pinus Murrayana*) in which the hotel was situated was regularly visited by a flock of the curious cross-bills (*Loxia curvirostra*) birds that feed upon the seed of such serotinous or tardily opening cones as these of the TAMARACK PINE. This they accomplish by forcibly inserting their long, sharp, incurved bills between the scales of the cones, closing the points of the bill beyond the seeds, the points passing each other and thus forcing the seeds out and into the mouth of the birds—a beautiful exhibition of the adaptation of means to ends.

Crows Eating Pine Seeds.—The cones of the black and other large-coned pines of the Sierra are attacked and the seeds extracted for food by a certain western crow—*Corvus Richardsonii*—which, feeding upon other substances at other times, turns his attention to the pine cones as soon as their seeds are sufficiently mature for food. Perching upon the limbs near the cone to be attacked, he strips up the tough scales with his sharp, strong beak, securing the seeds and leaving the cone mutilated, as far as he can reach around it from his position, leaving a mass of short, tough fibers, in place of the beautiful cones with their spiral wreaths of ornamental scales.

PINES IN LITERATURE.

ORIGIN OF THE PINE.

The origin of the pine is given thus in the Grecian mythology: Pan, the god who presided over the country and, consequently, had charge of rural objects and affairs, including forestry, had many love adventures, one of which was the attempt to win the love of a nymph of Mount Taygetus, the abode of the god. Boreas, the god of the north wind, became a rival of Pan and blew the nymph down from a high rock and would have killed her, but Pan, though unable to save her life, could change her form, so he changed the nymph into a pine tree (in Greek *Pitys*), and from that period pine trees have been seen clinging to rocks on mountain sides.

FIRST MENTION.

In the ancient writings of the Hebrews we read of the pine, the cedar, and the juniper, with some allusion to their appearance, and especially to their qualities.

The earliest descriptive writer on trees whose work has been preserved, is Theophrastus. He was the successor of Aristotle in the peripatetic school, and was born about 370 B. C. He wrote many books on a variety of subjects, the most important of which are two large botanical treatises that have come down to us, viz., *Historia Plantarum*, in nine books; *Causis* [origin] *Plantarum*, twelve books. In the *Historiæ de Plantis* he mentions



BRITTON & REY, S. F.

No. 17—*Pinus tuberculata*, GORDON. Knob-Cone Pine, near Shasta, on the western slopes; altitude, 6,000 feet.

the pine, giving a short description, and discusses its various products (resin, pitch, etc.), its qualities, uses, and the like; also, he writes of the abies, picea, cedar, juniper, balsam, and others. In the second treatise he gives very interesting items concerning the origin of these trees.

These treatises constitute the most important contributions to botanical science until we come down to modern times, and furnish evidence of the author's extensive and careful observation, combined with much critical sagacity.

Pliny, the elder (properly alluded to as the naturalist), after Aristotle the most learned of ancient writers, was born A. D. 23, and sacrificed himself to his devotion to science in 79, during the eruption of Vesuvius. He wrote much, one of his most valuable works being *Naturalis Historia* comprising thirty-seven books.

After discussing the animal world he writes: "It now remains for us to speak of the vegetable productions which," he states, "are equally far from being destitute of animal spirit."

A farther statement of Pliny's wise estimation of forest trees is quoted in the introduction to this investigation.

In speaking of resin trees, he writes: "Whereas there are in Asia several trees that produce pitch, in Europe there are but six varieties that supply it, viz.:"

1. The Pine (meaning the cultivated *Pinus pinea* of Linn).
2. The *Pinaster* (*P. sylvestris*, L.), which he calls "the wild pine."
3. The Pitch Tree (*Abies excelsa*, D. C.), now known as spruce.
4. The Fir Tree, with full branches, and used for ship building.
5. The Larch (*Larix Eropeæa*), our American species called Tamarack.
6. The Torch Tree, gives out more resin than either of the others (*Pinus cembra*).

Of these the *Pinus pinea* is the *Pitys* or pine tree of classical literature, both Greek and Roman.

He writes: "The pine and pinaster have long, thin leaves like hair, pointed at the ends. The pine yields the least resin of them all, in hardly sufficient quantities to warrant us in reckoning the pine among the resinous trees." [!]

"The *Pinaster*," he reiterates, "is nothing but a wild pine. It rises to a surprising height, and throws out branches from the middle just as the pine does from the top. This tree yields a more copious supply of resin than the pine."

He speaks of it as growing in flat countries like another that "is found along the shores of Italy" (a variety of *P. Sylvestris*).

"All these trees," he continues, "are evergreens" [not so the larch] "and not easily distinguished by the foliage even by those who are best acquainted with them."

Coming down to modern times, we find Tragus [Buck, in English] in 1552 describing and figuring very characteristically, referring also to such ancient authors as Theophrastus and Pliny, four pitch trees—two of them pines—*Pinus*, *Pinaster*, *Abies*, and *Larix*.

Dodoens in 1583 describes and figures:

Pinus sylvestris pinaster.

Pinus sylvestris altera.

Pinus maritima major.

Pinus maritima minor.

Caspar Bauhin, in 1623, published:

Pinus sativa.

Pinus sylvestris.

Pinus sylvestris montana altera.
Pinus sylvestris montana tertia.
Pinus maritima major.
Pinus maritima altera.
Pinus maritima minor.
Pinaster fructis erectis.
Pinaster latifolia erectis.
Pinaster ternifolias julo purpurascens.

Plukenet, in 1696, refers to or describes as "Species exotic rare and new:"

Pinus sativa of Bauhin.
Pinus sylvestris of Bauhin.
Pinus montana major of Bauhin.
Pinus montana virginiana, etc.

Tournefort, in 1700, describes all the above trees, giving the generic characters of Pine, Pinaster, Larix, Abies, Picea, etc.

In his great work the generic characters of the pine family were first given, previously no botanist ever thought of publishing generic characters because they were supposed to be understood.

Tournefort defined the genus of *Pinus* as follows (freely translated):

"*Pinus* is a genus of plants with amentaceous flowers; namely, composed of stamens only, but sterile; for the embryo is borne apart from the flower and develops into a fruit, among the scales of which are hollows, each containing one seed. To these characters are to be added the binary leaves produced from one sheath."

He then gives a list of ten species, the names of which are mostly credited to the Bauhins—Caspar and Johan—each species followed by several words of description, as was the custom of his time.

It should be here stated to the credit of Tournefort that the plants he admitted as pines are precisely those called such to-day. He did not give the genus so wide and unscientific a range as did Linnæus sixty-seven years later—as shown below.

Linnæus, in 1753, describes and gives the synonymy of the following:

Pinus pinea (*sativa*, of Bauhin).
Pinus sylvestris (*sylvestris*, of Bauhin).
Pinus tæda.
Pinus cembra (*sylvestris maritima tertia*, of Bauhin).
Pinus strobus (*P. virginiana*, of Plukenet.)

In 1767 Linnæus publishes his "*Systema Naturæ*," Tomus [book] II.

REGNA TRIA NATURÆ. [The 3rd Kingdom, i. e. Vegetables.]

Class Diæcia. Mares and feminae habitant in diversis thalamis et domiciliis.

Group Adelpheia [comprising *Pinus*, *Thuya*, *Cupressus*, *Gnetum*, *Sterculia*, and many genera of Euphorbiaceæ].

It will be noticed here that Linnæus did not separate *Gymnospermæ* (*Pinus*, etc.) from other classes, as is now done.

The following conifers are found under the above classification, described by phrases without giving synonymy or authorities (translated):

PINUS.—Masculine calyx 4-leaved, corolla wanting; stamens numerous, anther naked. Feminine calyx a *strobile*, scales 2-flowered, corolla wanting, pistil 1.

Leaves many, sheathed at base—

1. *Sylvestris*, leaves in pairs, primary leaves solitary, smooth.
2. *Pinea*, leaves in pairs, primary leaves solitary, ciliate.

3. *Tæda*, leaves in 3's (with a long description).
4. *Cembra*, leaves in 5's, smooth.
5. *Strobus*, leaves in 5's, edge rough; bark smooth.
6. *Cedrus*, leaves fascicled, acute.
7. *Larix*, leaves fascicled, obtuse.

Leaves solitary, base not sheathed—

8. *Picea*, leaves solitary, notched at the end.
9. *Balsam*, leaves solitary, somewhat notched at the end.
10. *Canadensis*, leaves solitary, obtuse, membranous, etc.
11. *Abies*, leaves solitary, mucronate, etc.
12. *Orientalis*, leaves solitary, triangular.

The genera of *Thuja*, *Cupressus*, *Juniperus*, *Taxus*, and *Ephedra* find places under other heads by his artificial system; while, as seen, our cedar, larch, spruce, and fir are all called pines. Later European authorities of the present century, Spach (1834), Don (1835), Link (1841), Lambert (1842), Loudon (1844), Endlicher (1847), Carriere (1855), Gordon (1858), Parletore (1868), described or re-classified the cone-bearers, gradually eliminating the pines from the rest of the order, and so dividing the family into groups of species more or less numerous.

As an example, Gordon in his *Pinetum* describes at length 85 species and gives 274 synonyms, often one pine bearing many names; as instance, four of them have from 9 to 17 names each, given them all by one collector—Roezl—who seems to have considered the slightest difference of appearance or locality connected with his pines found in Mexico as entitling them to distinctive names; besides, he had a mercenary end in view, filling his pockets from the European subscribers for his many "new species."

AMERICAN PINES—WHEN PUBLISHED.

The description of American pines began with Plukenet in 1696, when he mentions a pine from Virginia (*Strobus*).

Linnæus, in 1753, enumerates among the true pines *Strobus* and *Tæda*.

Omitting the farther elaboration and classification of Eastern United States species by various authors, we come down to the discovery of—

PACIFIC SLOPE PINES.

With the discoveries of Coulter, in 1831, and the publishing of "Four New Pines," in Linn. Trans., 1837, by Don, begins the list of Western pines: *Coulteri*, *muricata*, *radiata*, and *tuberculata* (the two last being forms of *Monterey pine*).

Douglas' discoveries, under his names for them, were published first by Lambert in his great illustrated work, "PINES," 1842—*monticola*, *Lambertiana*, and *Sabiniana*. Loudon in "Pinetum," 1844, published some more of Douglas' pines, to wit: *ponderosa*, *contorta*, and *insignis*.

Jeffrey's discoveries made in 1852, were published in 1853 (anonymously) by Prof. Balfour, in "Report of the Oregon Committee"—*Jeffreyi*, *Balfouriana*, and *Murrayana*. Dr. Bigelow, in Pacific R. R. Reports, added *flexilis*, collected by Dr. James on Long's Expedition. Torrey in "Botany of the Mex. Bound. Survey," 1859, published *monophylla*. *Parryana* (as *Llaveana*) and *Torreyana* (by Parry). Engelmann, under various dates, published *aristata*, *reflexa*, *albicaulis*, *edulis*, *cembroides*, *Chihuahuana*, and

Arizonica (the last collected by Rothrock), and lastly, Gordon in his "Pinetum," 1875, published the true *tuberculata*.

PRINCIPAL AMERICAN PUBLICATIONS.

Space admits of but the bare mention of the principal publications of North American pines, some of them illustrated: Eaton's Manual, Elliott S. K., Michaux Flor. Am. Bor., Darby's Bot. S. States, Chapman Flor. S. States, Newberry's Pacific R. R. Reports, Michaux & Nuttall's N. A. Sylva (beautifully illustrated), Robinson's Trees of Mass., Curtiss' Resources of S. Forests, Torrey in Pacific R. R. Reports and Bot. Mex. Boundary, Lesquereaux Arkansas Flora, Gray's Manual, Wood's Class Book, Hoopes' Evergreens, Young's Bot. of Texas, Hall's Bot. of Texas, Vasey's Catalogue of Forest Trees, Rothrock's Wheeler's Explorations, Kellogg's Forest Trees of California, Bolander in Proc. Cal. Acad., Veitch's Manual of Cone-Bearers, Watson in King's Survey 40th Parallel, Engelmann's Revision of the Genus *Pinus* and his "*Abietineæ*" in Bot. Cal., Prof. Sargent's Forest Trees of North Am. in 10th U. S. Census, various publications of the Forestry Bureau, Department of Agriculture, and 1st Biennial Rep. Cal. State Board of Forestry.

Of these publications special mention should be made of Michaux & Nuttall's Sylva, with illustrations, 1835, Hoopes' Evergreens, Engelmann's "auf klarung," as the German might express it, of the great confusion previously existing in the literature of pines, by his scholarly and profound "Revision of the Genus *Pinus*," and his description of Tribe *Abietineæ*, in Bot. Cal., 2d Vol., both published in 1880; and Prof. Sargent's elaborate and exhaustive descriptions of the habitat qualities, uses, values, products, etc., of the forest trees, as cited.

NUMBER OF SPECIES OF PINES.

The Hebrews wrote of the "Pine," knowing but one tree of the name, since named *Pinus sativa* by Bauhin, and renamed *P. pinea* by Linnæus.

Theophrastus wrote of "Pine" and "Pinaster," the "wild pine" (pinaster meaning like a pine), now our *P. sylvestris*.

Pliny mentions these two trees and alludes to a third "along the shores of Italy," resembling it; (*P. maritima*, Lamark).

Tragus describes 2 species.

Dodoens describes 4 species.

Bauhin describes 10 species.

Tournefort describes 10 species.

Linnæus condensed the forms to 5 true pines (as now classified), while admitting several other genera as pines.

Gordon describes 85 species, and a great number of varieties under a host of provisional names, given by zealous collectors.

Dr. Engelmann, in Revision of the Genus *Pinus*, enumerates 76 species as the product of all the earth, putting 12 of the names in parentheses as synonyms, or marked varieties. Of these 34 species are within the United States and Territories, with 7 of his under synonyms. In Botany of California, Vol. II, he describes 14 species and 5 varieties—the latter being *albicaulis*, *aristata*, *Jeffreyi*, *scopulorum*, and *Murrayana*.

Sargent, in Forest Trees of the United States, describes 34 species, raising (by his direction having revised his classifications) 5 of Engelmann's varieties to the rank of species, to wit: *albicaulis*, *reflexa* *Jeffreyi*, *serotina*,

and *clausa*, and in Sargent's work one of Engelmann's new species (*P. Elliottii*) is reduced (by the doctor's direction) to a variety of *P. Cubensis*.

In this publication another of Engelmann's varieties (*aristata*) is taken away from *P. Balfouriana* and given full rank, making 23 species on the Pacific Slope, 18 in California, with 10 marked varieties.

DIAGNOSIS OF THE GENUS PINUS.

The genus *Pinus* belongs first of all to the great class of—

GYMNOSPERMÆ,

Plants with ovules orthotropous, naked upon the surface of a scale or bract within a more or less open perianth, fertilized by the direct contact of the pollen with the nucleus. Flowers monœcious or diœcious. Cotyledons usually more than 2 in a whorl.

Wood composed mainly of disk-bearing (pitted) tissue without proper vessels.

The class comprises:

Order Gnetaceæ—Joint-stems.

Order Taxaceæ—Yew trees.

Order Coniferæ—Cone-bearers.

Our genus *PINUS* belongs to the latter.

CONIFERÆ.

Resinous, mostly evergreen trees, with usually acerose or scale-like leaves, monœcious or rarely diœcious; male flowers reduced to the stamens only, indefinite in number, often numerous; the filaments upon a central axis with the anther cells (2 or more) adnate to the back of the connective or suspended from the under side of its scale-like or peltate summit; fertile aments consisting of few or many scales, becoming in fruit a dry cone, or fleshy and berry-like in *Juniperus*; ovules naked, 2 or more at or on the base of each scale, adnate or free, erect or inverted; seeds naked or winged, with chartaceous or crustaceous, or sometimes bony testa. Embryo straight, axile in fleshy, oily albumen. Cotyledons 2 to several in a whorl.

Trees or shrubs of cold or temperate latitudes principally comprising three TRIBES.

Cupressineæ—Cypresses.

Taxodineæ—Sequoias.

Abietineæ—Firs, Spruces, and Pines.

Our genus is in the last tribe:—

ABIETINEÆ.

Scales of the fertile ament numerous, spirally imbricated, carpellary, each in the axil of a thin bract, in fruit becoming a coriaceous or ligneous strobile or cone. Ovules 2, adnate to the inner face of each scale near the base, inverted. Seeds usually separating from the scale at maturity, and carrying away a conspicuous, scarious wing. Cotyledons 3 to 16. Anther cells 2, extrorse, parallel and contiguous upon the sides of the connective,

which is often surmounted by a scarious, dilated, inflexed tip or crest. Leaves scattered, in the genus *Pinus*, from linear to acerose. Leaf buds scaly.

Contains five Genera, the four first named maturing their cones in one year.

1. *ABIES*—the *FIRS*. Leaves sessile, leaving circular scars; cones erect, their scales deciduous from the axis. Seeds with resin vesicles.

2. *PSEUDO-TSUGA*—*DOUGLAS SPRUCE*. Leaves petioled, the scars transversely oval; cones pendulous, scales persistent. Seeds without resin vesicles.

3. *TSUGA*—*HEMLOCK*. Branchlets rough from the prominent, persistent leaf-bases, bracts of the cone smaller than the scales; cones pendulous. Leaves petioled, with a single dorsal resin duct. Seeds with resin vesicles.

4. *PICEA*—*SPRUCES*. Having also the above characters of *Tsuga*, except leaves sessile, keeled on both sides with 2 lateral resin ducts. Seeds without resin vesicles.

5. *PINUS*—*PINES*. Cones requiring 2 (in one European species 3) years to complete their growth, their bracts becoming corky and thickened; leaves (the conspicuous foliage) in fascicles of 2-5 (solitary in *P. monophylla*) from the axil of scarious bracts, their base surrounded by a sheath of scarious bud-scales (called the sheath) usually serrulate. Pollen 2-lobed. Resin ducts inconstant in number, usually numerous, variously situated.

ANALYSIS OF ORGANS.

LEAVES AND THEIR MODIFICATIONS.

(Always arranged in spirals, except the first.)

True Leaves.—1. Cotyledons (4-18).

2. Primary; always solitary, usually serrated.

3. Secondary; always conspicuous, terminating an undeveloped branch and in bundles (one solitary, *i. e.* *Pinus monophylla*), of from 2-5, and sheathed at base with bracts.

Duration.—Pine leaves are either soon deciduous, or falling in the autumn of the second year, or the third year, or they persist indefinitely four to many years.

Structure.—Leaves are composed of—

1. Epidermis, which is thin or thick.

2. Parenchyma (main tissue), meager or abundant.

3. Resin ducts, which are either peripheral, *i. e.*, near the epidermis; parenchymatous, *i. e.*, in the main tissue; or internal, near fibro-vascular bundles. (These latter are microscopic, but important characters, distinguishing the pine family into large sections.)

4. Fibro-vascular bundles (2), the woody, central portion, more or less united.

5. Strengthening cells, conspicuous, or rarely absent.

The leaves also are either sessile or peduncled, and either serrulate or entire; acute, obtuse, or denticulate; also, they bear longitudinal rows of white lines of stomata over either or both surfaces, or with none, or but few on the back in some species.

Bracts.—They are of five kinds and are either fringed or entire, often articulated and either deciduous or persistent:

1. Ordinary, found at base of leaves or along internodes.

2. Sheathing, few to many around leaf-bundles.
3. Bud-scales, few to many surrounding embryo leaves.
4. Involucral, few to many sub-tending male flowers.
5. Amentaceous, entire or dentate, corky and concealed at maturity by carpellary scales.

FLORAL ORGANS.—MONŒCIOUS.

Male.—Compound flowers arising annually from the base of the season's growth and composed of few or numerous short or elongated spikes:

1. Involucre, of few or many oval or dissimilar scales.
2. Staminal column, $\frac{1}{2}$ inch to 4 inches long.
3. Anthers, 2-celled, crowded, and composed of (a) connective, which is either rounded or crested; (b) pollen, bi-lobed, 0.045–0.25 lines in diameter.

Female, or Cone.—An ament becoming a cone, arising either sub-terminal, *i. e.*, near the leaf-bud; or lateral, *i. e.*, along the shaft of a growing shoot (important distinguishing characters), all requiring two years to mature them (one requiring three years), hence, seemingly becoming lateral the second season by the prolongation of the stem. Cones are either sessile or peduncled, and either solitary or opposite, or verticillate or clustered.

Dehiscence.—Cones are found either—

1. Remaining erect, or are declined during second season.
2. Falling at maturity entire, or leaving basal scales.
3. Persisting on the trees two to many years either—
 - (a) Firmly closed, preserving the seed for years; or
 - (b) Open more or less, shedding the seed at maturity.

Appearance.—Cones are either—

1. Globose, depressed, oval, ovate, or cylindrical.
2. Symmetrical, or more or less oblique or knobbed.
3. Colored differently at the two stages—yearlings and mature.
4. Various sizes according to species, conditions, etc.

Structure.—Cones are composed of—

1. Carpellary scales, few or very numerous; more or less flattened and imbricated; thin and leathery, or thick and corky, and composed of—

(a) Claw, attaching to axis or placenta, and channeled above to hold the two seeds.

(b) Blade, more or less compressed and striated.

(c) Apophysis, the exposed upper part, usually thickened, and either rounded, pyramidal, or dimidiate; also either naked or umbonate or pustulate; the umbo either armed with weak, deciduous, or persistent prickles; or with strong spines or hooks. (The characters of the Apophysis are found to be of paramount importance in distinguishing groups.)

2. Bracts, concealed at base of scale, channeled beneath, to hold the two seeds.

3. Ovules (2), naked, *i. e.*, without either pistil or stigma (giving the name *Gymnospermæ* to the class.)

Phyllotaxy.—The arrangement of the carpellary scales is quite interesting, but of little diagnostic importance, since they differ in the same species—often in the same tree.

The arrangement is by series of spirals, two of which, inclining in opposite directions, right and left, are the most prominent. The most common numbers are 3 and 5, 5 and 8, 8 and 13, and 13 and 21.

Seeds.—The seeds of the pine are destitute of resin but abounding in oil;

their form is either globular, ovate, oblong, or obliquely triangular; in size they are 2-12 lines long. Their parts are:

- (a) Envelope, a more or less hard case or shell (*testa*), and a close wrapping sheath (*endocarp*).
- (b) Albumen, abounding in oil.
- (c) Embryo, inverted and composed of—
Cotyledons, 5-18 and elongating.
Radicle, becoming a rootlet.

DR. ENGELMANN'S CLASSIFICATION OF THE SPECIES OF PINUS.

[From Botany of California.]

§ 1. Apophysis thin, with a terminal, unarmed umbo; anthers terminating in a knob, or a few teeth, or a short, incomplete crest; leaves in fives, with (in our species) peripheral resin ducts, their sheaths loose and deciduous; cones, sub-terminal.—*Strobus*.

- * Wings longer than the seeds; leaving serrulate and (at least when young) denticulate at tip; female aments, long peduncled.
- + Strengthening cells few.

1 *P. monticola*.

+ + Strengthening cells abundant.

2 *P. Lambertiana*.

- * * Wings much shorter than seeds; leaves mostly entire; not denticulate at tip.

3 *P. flexilis* (*albicaulis*) (*reflexa*).

§ II. Apophysis with a mucronate or (very rarely) blunt protuberance on the back; anthers terminating in a semiorbicular or almost orbicular crest, except in the first three species.—*Pinaster*.

- * Resin ducts peripheral; leaves with entire margins and loose, deciduous sheaths.
- + Leaves 1-5; cones ovate, subglobose, with few very protuberant scales; seeds large, almost wingless.

4. *P. monophylla*.

5. *P. Parryana*.

- + + Leaves in fives; cones ovate to subcylindrical, with numerous scales; seeds small, winged.

6. *P. Balfouriana*, Var. *aristata*.

- * * Resin ducts parenchymatous; leaves serrulate, with stomata on all sides; sheaths persistent.
- + Cones subterminal. + Leaves in fives.

7. *P. Torreyana*.

+ + Leaves in threes.

8. *P. ponderosa*, Var. *Jeffreyi*, Var. *scopulorum*.

+ + + Leaves in pairs.

9. *P. contorta*, Var. *Murrayana*.

+ + Cones lateral. + Leaves in threes.

10. *P. Sabiniana*.

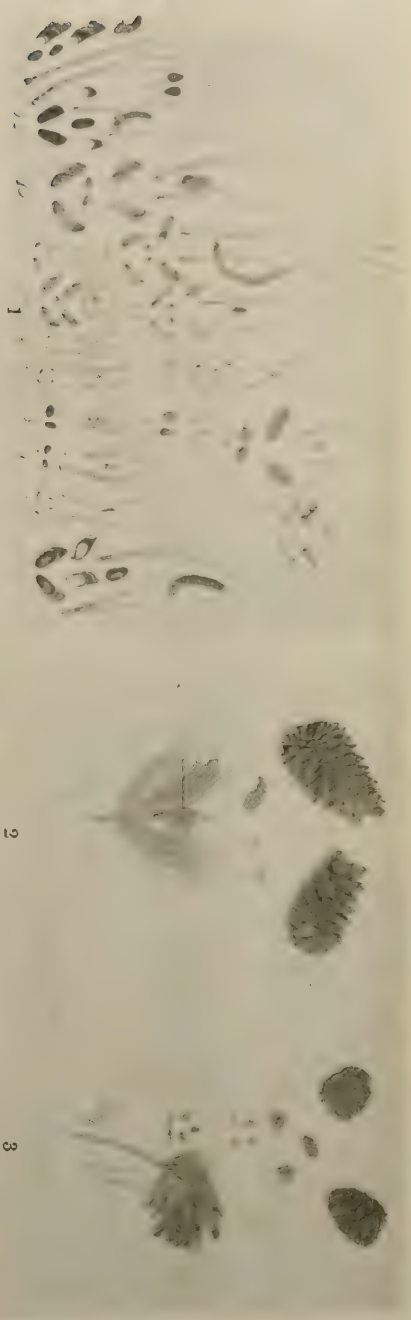
11. *P. Coulteri*.

12. *P. insignis*.

13. *P. tuberculata*.

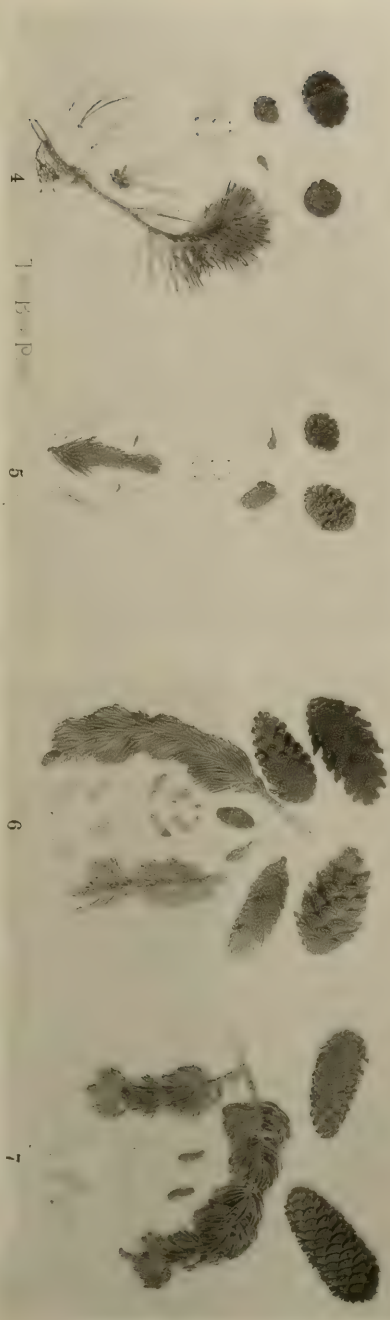
+ + Leaves in pairs.

14. *P. muricata*.



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3



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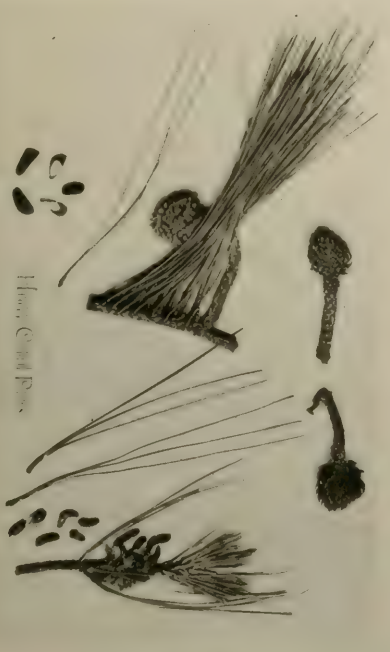
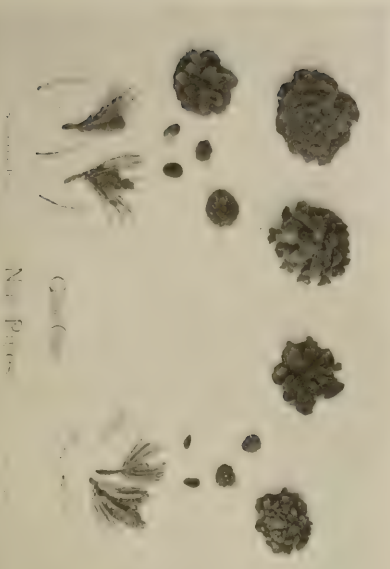
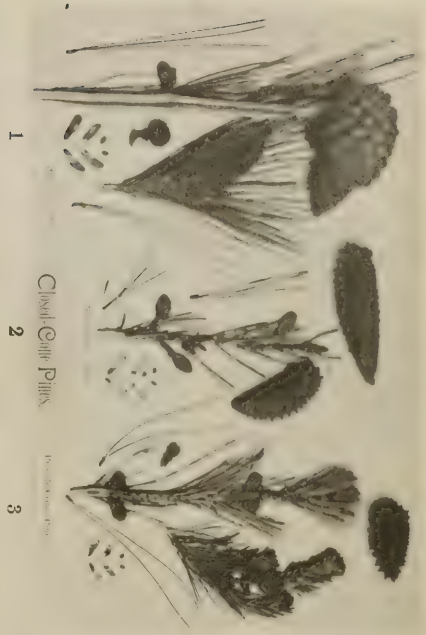
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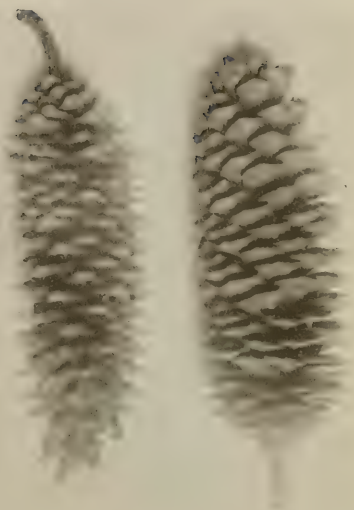
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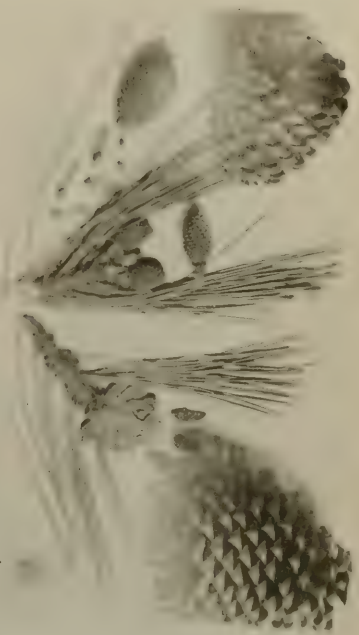
FRUIT, FLOWER, AND FOLIAGE CHARACTERS OF CALIFORNIA PINES—One-sixth natural size.
 No. 1. Leaves, flowers, and seeds; 2. *Pinus flexilis*; 3. *Pinus albicaulis*; 4. *Pinus contorta*; 5. *Pinus murrayana*; 6. *Pinus balfouriana*; 7. *Pinus aristata*.



FRUIT, FLOWER, AND FOLIAGE CHARACTERS OF CALIFORNIA PINES—One-sixth natural size.
 No. 1. *Pinus insignis*; 2. *tuberculata*; 3. *monophylla*; 4. *murricata*; 5. *Parryana*; 6. *Coulteri*; 7. *Sabiniana*.



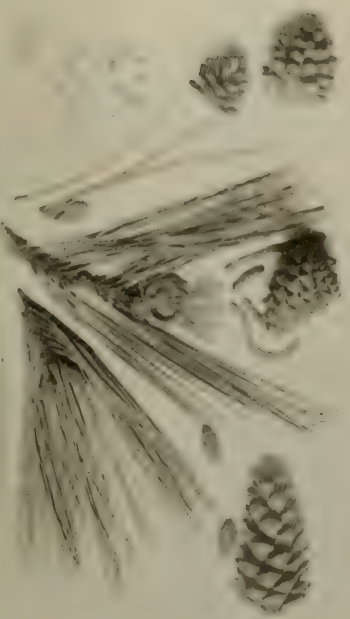
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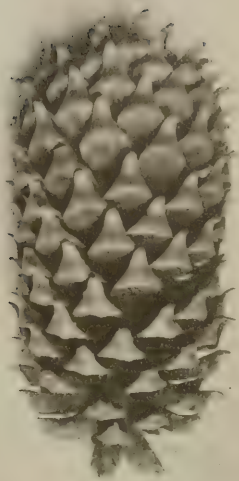


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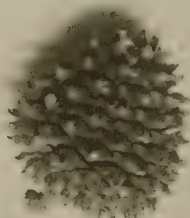
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FRUIT FLOWER AND FOLIAGE CHARACTERS OF CALIFORNIA PINES.—One-sixth natural size. No. 1. Open Cones of *Pinus Lambertiana*; 2. unopened Cones, Foliage, &c. of *Pinus Lambertiana*; 3. *Monticola*; 4. *Jeffreyi*; 5. *ponderosa*.



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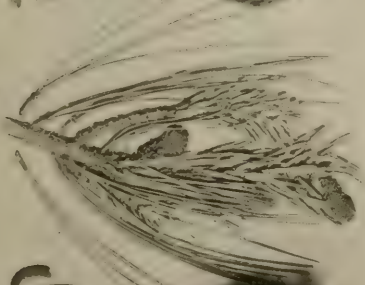
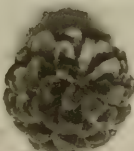


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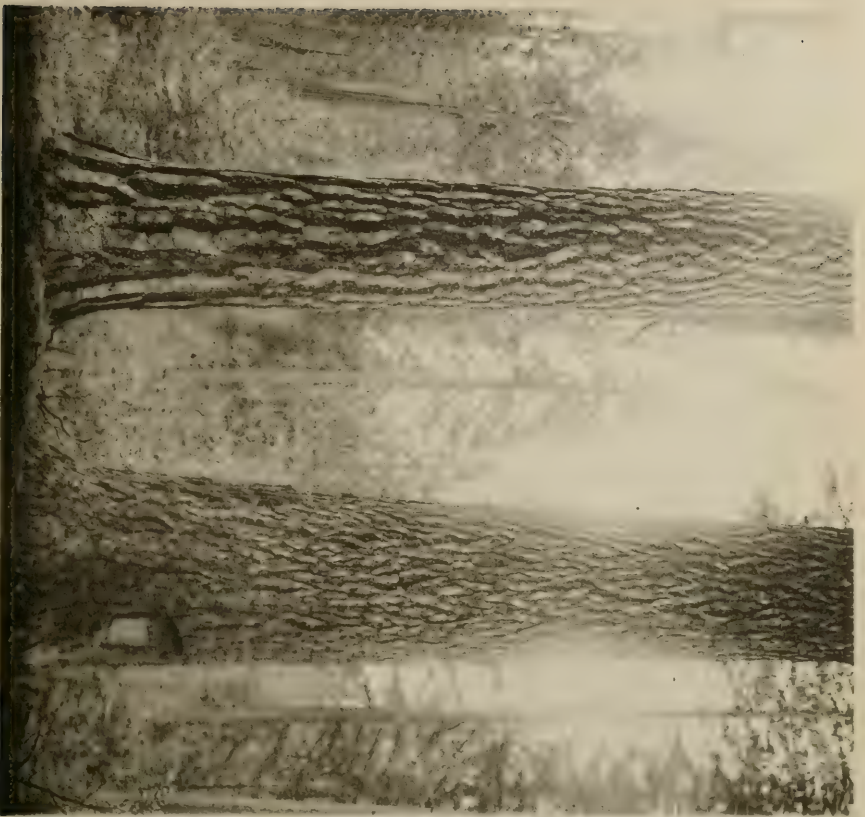
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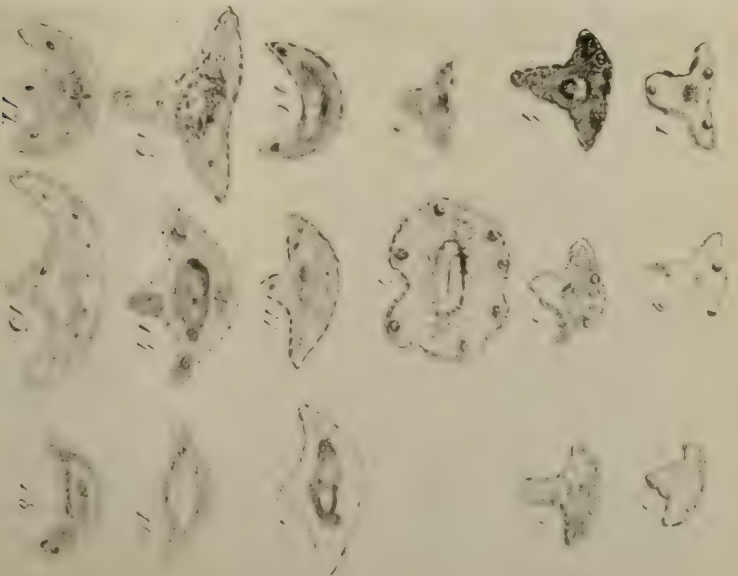


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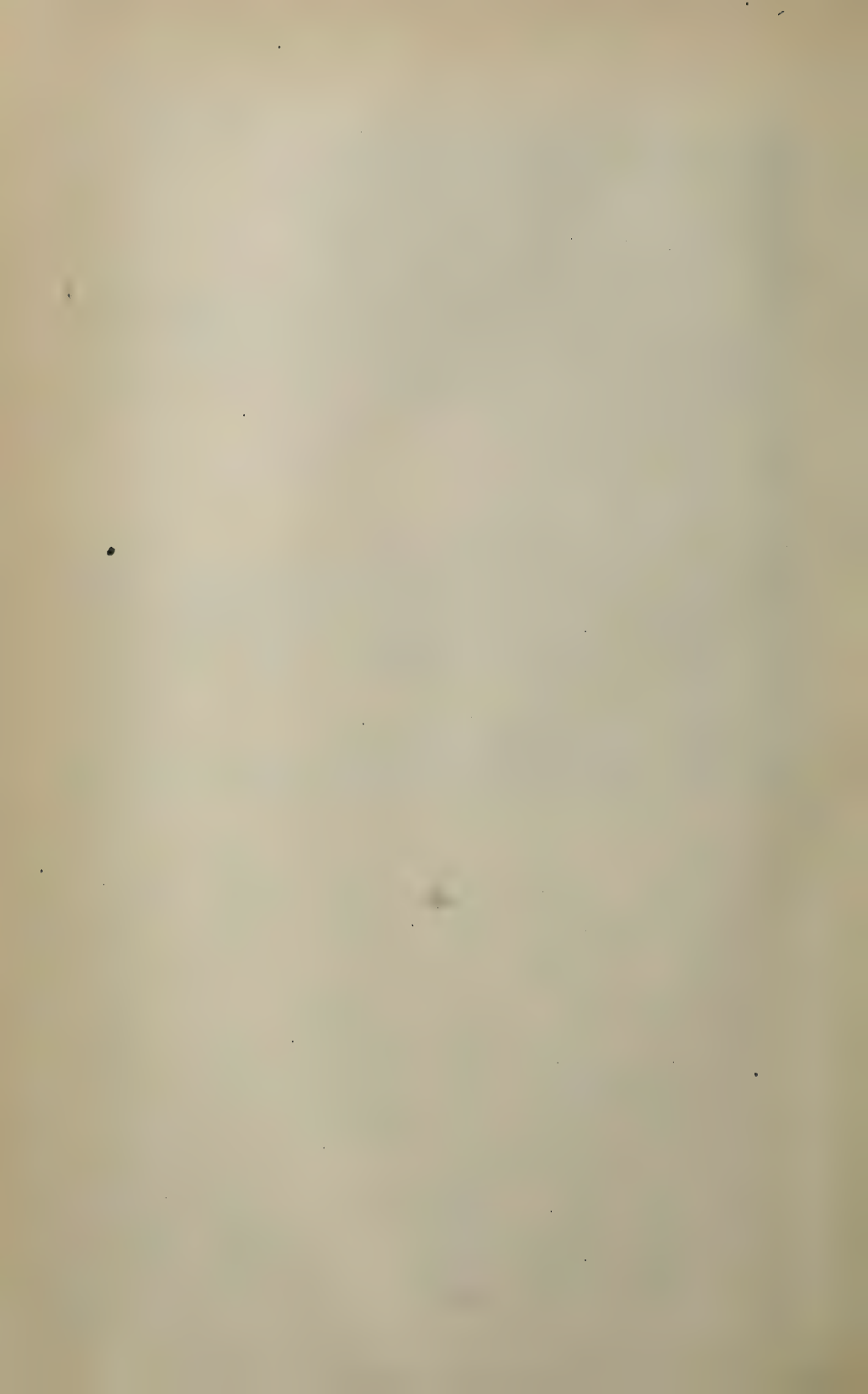
FRUIT, FLOWER, AND FOLIAGE CHARACTERS OF CALIFORNIA PINES—One-sixth natural size.
No. 1. Open cone of *Pinus Coulteri*; 2. Unopened cones of *P. Coulteri*; 3. Opened cones of *P. Sabiniana*; 4. Details of *P. Torreyana*.



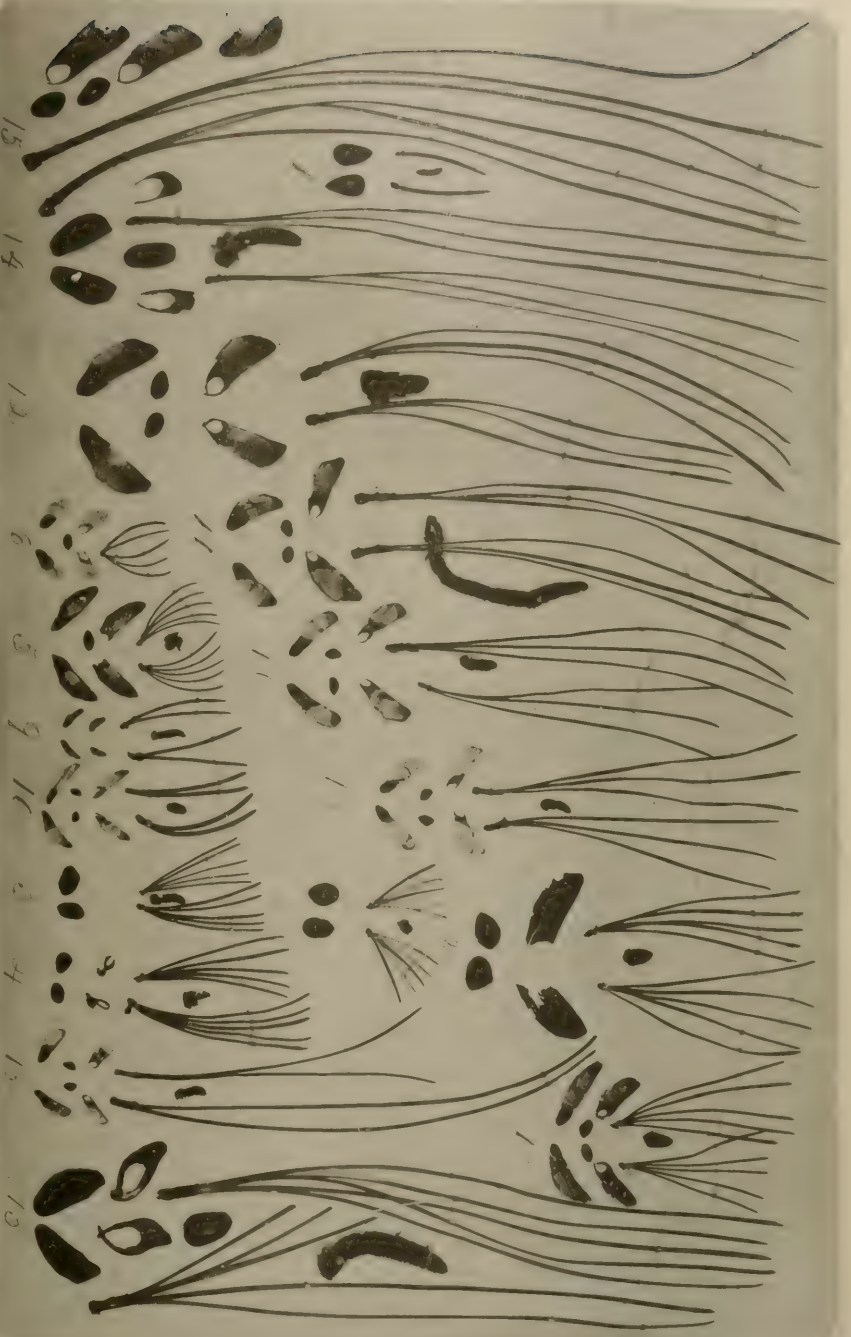
YELLOW PINE.
SUGAR PINE.
Trunks of pine trees, showing character of bark.

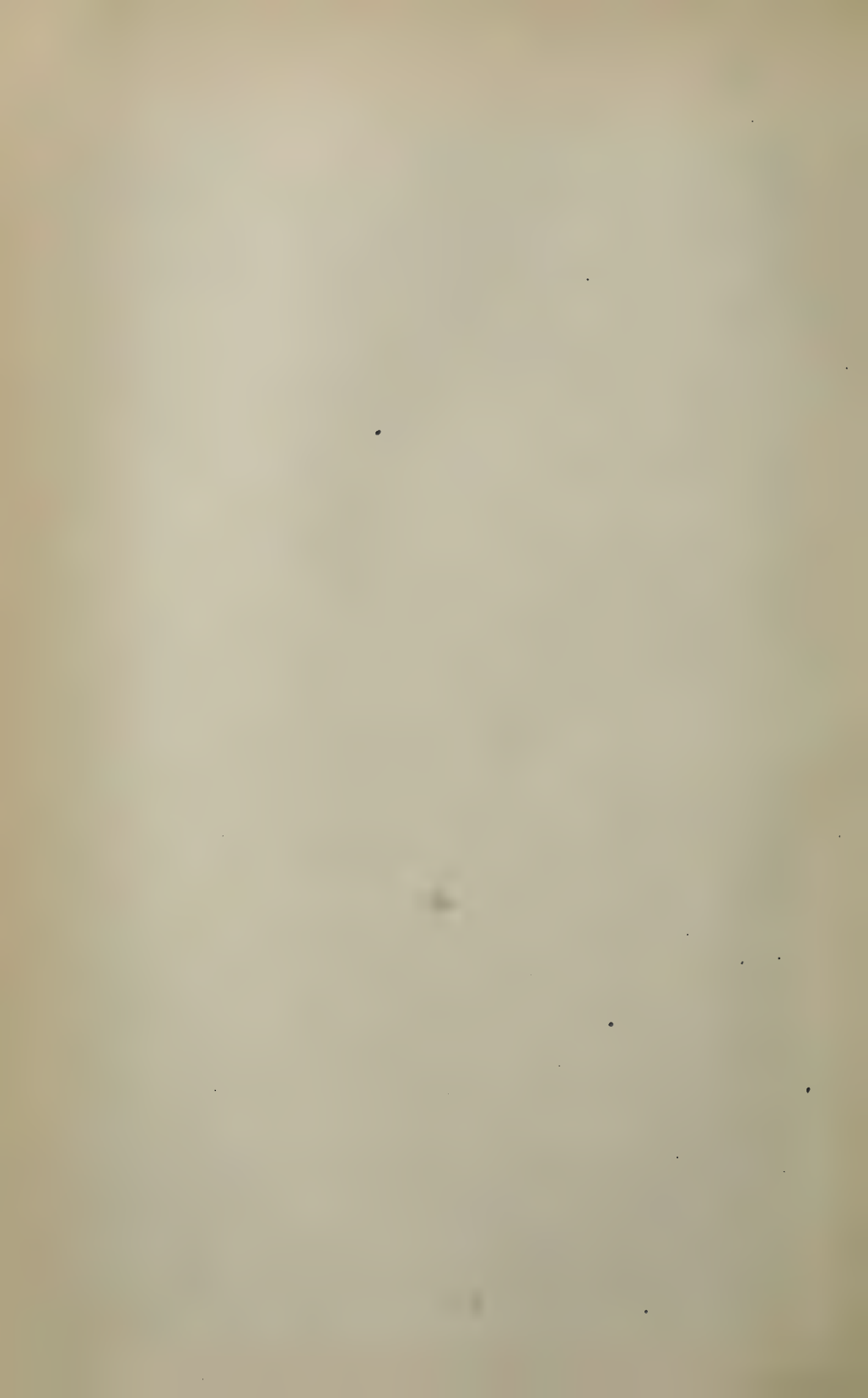


CROSS SECTIONS OF PINE LEAVES—Magnified 11 diameters. The numbers correspond to those of the descriptive list.



LEAVES, SEEDS, WINGS, AND MALE FLOWERS OF THE 18 CALIFORNIA SPECIES—One-third natural size. No. 1. *Pinus monicola*; 2. *Lambertiana*;
 3. *Pinus flexilis*; 4. *albicans*; 5. *Balfouriana*; 6. *aristata*; 7. *monophylla*; 8. *Parr yana*; 9. *contorta*; 10. *Murrayana*; 11. *ponderosa*;
 12. *Jeffreyi*; 13. *Torreyana*; 14. *Sabiniana*; 15. *Coulteri*; 16. *insignis*; 17. *tuberculata*; 18. *muticata*.





REPORT

OF THE

Engineer of the State Board of Forestry.

REPORT OF ENGINEER.

LETTER OF SUBMITTAL.

To the California State Board of Forestry:

GENTLEMEN: On the first day of August, 1887, having been commissioned by your honorable Board to continue the work so ably and successfully commenced by Mr. Hubert Vischer, I assume the duties of Engineer of the State Board of Forestry. I was instructed to visit the timbered sections of the State, to prepare forest maps of the same, and to collect whatever data bore upon the subject of the protection and preservation of our forests. Acting upon these instructions, I have visited and located the forest growths of the following counties: Siskiyou, Modoc, Lassen, Shasta (east of the Sacramento River), Plumas, Sierra, Nevada, Placer, Tehama, Butte, El Dorado, Amador, Colusa, and Yolo. Forest maps have been prepared of all these counties except Colusa and Yolo, and are appended to this report. The chief object of the maps is to show the location and extent of the forests, and while it was attempted to give a correct idea of their situation, no account was taken of the innumerable bald hillsides, bare flats, and ridges, which occur throughout all of the forests, unless they were of large extent.

The boundary lines of forests are seldom located alike by two persons, their ideas of where a forest begins or ends being often very dissimilar, and thus apparent errors may have been made. Forest growths have been generally referred to by the names under which they are best known in their respective localities, and have been placed upon the maps in the same manner. A general description of the timber belts in each county is given, but as their locations are shown upon the maps, repetition was avoided as much as possible.

I have to acknowledge the courtesies shown to your Engineer by all of the citizens met with in the counties visited, likewise the information which they most willingly furnished. Especially am I indebted to the various County and United States Deputy Surveyors, who were always both able and willing to give much important and extensive information.

The Board is also greatly indebted to William Hammond Hall, State Engineer, for the use in advance of publication, of the valuable State maps which he had prepared, and to R. P. Hammond, Jr., United States Surveyor-General, who kindly furnished room in his office for draughting purposes.

Respectfully submitted.

H. S. DAVIDSON.

SAN FRANCISCO, November 1, 1888.

THE SIERRA FORESTS, AS PRODUCERS OF LUMBER—THE PREDOMINANT VALUE OF DIFFERENT BELTS.

Of all questions of vital importance to the welfare of California, the forestry problem has received the least attention. Accustomed to draw upon our forest resources with little or no thought for the future, acting upon the prevalent impression that our forests have to serve no other purpose but to provide lumber and fuel for our immediate wants, we have treated them as though they were wildflower gardens—picking choice blossoms here and there, and leaving the rest to shift for themselves, regardless of the result. Trees desired for some particular purpose have been felled, while their less valuable brethren have been left to wait patiently for the time when scarcity of timber shall make the neglected and despised scrubs of to-day of marketable value. But of late years the people of California have awakened to the fact that our forests are not only valuable for the lumber and fuel with which they supply us, but also as regulators of hydrologic and climatic conditions (which have been referred to in another chapter), and have at last made a move toward their protection.

As furnishers of raw material, our forests play an important part in the future prosperity of the State.

How to preserve the wood necessary for our buildings, fences, railways, and mines, as well as for manufacturing and domestic purposes, is a question which daily becomes of greater importance, and one which demands immediate attention.

It is true that the forest wealth of California is enormous, but there exists only a supply commensurate to the prospective wants of her people.

While the forest area of California will never increase, the population is rapidly doing so.

Timber is a natural product whose pecuniary value is dependent upon its economic application. In the form of lumber it becomes the product of labor, and the cost of production determines its value, whereas the wealth of the timber contained in the forests which cover our mountain slopes is regulated by the accessibility of its position, the cost of transporting it to a market, etc.

With the increase of our population, new districts are settled and improved, lands formerly considered of no real value are placed under cultivation, and the line separating the tilled from the untilled region is speedily advancing over the less elevated portion of the latter. Inseparable from a productive country is the need of cheap transportation; and new wagon roads are built, old ones repaired, and soon a railroad is constructed to meet the growing demand.

Thus, much timber formerly of little intrinsic value, on account of the absence of cheap transportation, is made available, and its pecuniary worth being increased an hundredfold, it is felled and sent to a market.

It must be remembered that we are drawing on the capital stock of our forests without the least attempt towards replantation, and as the natural reproduction is very small, owing to the want of proper protection, the question resolves itself into the simple problem: "Given the present amount of standing timber and the actual consumption (including destruction and waste), to determine how long it will last."

Vast numbers of people are almost daily arriving from the more populous Eastern States, looking for land upon which to settle and make themselves homes. One of the first requirements made by a land seeker is, the inexpensive access to a sufficiency of wood, and proportionally as these new settlers take up and improve land, our timber area is reduced.

An increase of population must necessarily be accompanied by an increased demand for lumber, but with an increase in the demand, there follows a decrease in the supply, and finally the demand will exceed the supply, and we shall be obliged to procure our lumber elsewhere.

Not only will our forests be drawn upon to supply the home demand, but other States and Territories will look to us for a portion of their lumber.

The extensive country east of the Rocky Mountains and extending to the Mississippi River, has for years drawn upon the forests of Michigan, Wisconsin, and Minnesota for its lumber, and when these at one time magnificent forests are exhausted, will turn to the Pacific Coast for the greater part of its timber.

As the lumber supply east of us gives out, the eastern lumbermen push west to seek new fields, and already a great deal of capital has been invested in California timber lands.*

During the past two years, speculation in timber lands in the Sierra Nevada Mountains has been rife. On school lands alone timber representing millions of feet of lumber has either been bought and paid for or has been filed and refilled upon in such a manner as to keep control of it.

Hon. Theo. Reichert, State Surveyor-General, has kindly furnished the following report as to the number of acres of timbered land in some of the northern counties that have been paid for by purchasers from the State from January 1, 1887, to October 15, 1888:

Siskiyou County	13,000 acres.
Lassen County	800 acres.
Sierra County	1,580 acres.
Placer County	320 acres.
El Dorado County	1,000 acres.
Shasta County	11,500 acres.
Tehama County	1,760 acres.
Plumas County	2,900 acres.
Butte County	720 acres.
Amador County	640 acres.
	34,320 acres.

That is, fifty-three and six tenths square miles of forest.

In each township there are two school sections, Sections 16 and 36, leaving thirty-four sections of Government land, and since the cash-entry law has come into effect, purchasers can obtain possession of Government timber land at the same price (\$2 50 per acre) and with as little trouble as of school land. It is true that one person can buy but one hundred

* A correspondent to the San Francisco "Daily Morning Call," under date of August, 1887, writes as follows: "I have just returned from a trip through the northern counties, and I have never seen a finer country than Siskiyou County affords. The climate and scenery are something wonderful. I have spent some two months in Siskiyou, having been sent there as an expert for Sugar Pine timber land, and I must say the timber in Squaw and Elk Valleys exceeds that of Michigan and Montana. I have been all over the State and Territory named to purchase timber land, but found the Sugar Pine of which I was in search very scarce there. It will not be more than a year before we eastern millmen will come to California for our Sugar Pine, as this timber is hard to find in the East, and it is valuable for ship building. There will arrive in California soon an eastern syndicate of wealthy millmen, and this may have the effect of sending the timber lands of Siskiyou up in the market. My purchases have been one thousand two hundred and forty acres, at \$1 20 an acre, and I am satisfied that in a year's time similar land will bring \$4 to \$5 per acre. I expect to return next year and erect my sawmill, and in the meantime will have my machinery made."

and sixty acres of Government land, whereas he can obtain as high as six hundred and forty acres of school land; but he is obliged to choose his school land from two designated sections in each township, while with the Government land he has thirty-four sections in each township to select one hundred and sixty acres from, and by getting others to purchase also can frequently secure a large continuous body of timber. Thus the inducements for purchasing Government timber lands are as great, if not greater, than those offered by State lands, and in the past twenty-two months (January 1, 1887) there have been purchases from the Government in the following counties: Siskiyou, Modoc, Lassen, Shasta, Plumas, Butte, Tehama, Yuba, Sutter, Placer, Nevada, Sierra, Amador, El Dorado, and Calaveras. The estimate of the number of acres is based on the following entries at local land offices, each entry presumably covering one hundred and sixty acres:

Shasta Land Office.....	296 entries, or 47,360 acres.
Susanville Land Office.....	84 entries, or 13,440 acres.
Marysville Land Office.....	327 entries, or 52,320 acres.
Sacramento Land Office.....	116 entries, or 18,560 acres.

We would then have in the counties enumerated two hundred and five and three fourths square miles of Government timbered land, and probably the best and most heavily timbered, that has become private property in the past two years, making a total (including school lands) of two hundred and fifty-nine square miles, or one hundred and sixty-five thousand seven hundred and sixty acres, representing, at a very low estimate, one billion five hundred million feet of lumber that has been sold since January 1, 1887. As regards filing on timber land in this State, it is safe to say that it is done for speculation only. No man can clear or make a living on one hundred and sixty acres of heavily timbered land, nor, for that matter, on six hundred and forty acres; consequently, to a poor man, the land is of no value unless he can sell it, and this he does as quickly as possible, generally to millmen or capitalists. Thus the poor man defeats the effects of the very law which was made for his benefit. The history of the California redwood cases in Humboldt County,* is to-day being repeated in our sugar pine forests.

Why both the Government and the State still continue to sell all timbered lands at \$2 50 per acre, without regard to their present or prospective worth, is a problem most difficult to solve. If all timbered lands were graded, and prices in keeping with their present values set upon them, it

* Referring to office report of 1886 and 1887 regarding certain entries of land in the Humboldt (California) District, under the Act of June 3, 1878, alleged to have been made in the interest of the Humboldt Redwood Company, hearings having been held in regard to forty-seven of these entries, and by office decisions of March 29 and April 14, 1888, the same were held for cancellation. The testimony at these hearings showed that the entries were made in the interest of a syndicate organized for the purpose of securing title to a large tract of land very valuable for the redwood timber thereon. The entries were shown to have been made by reckless and wholesale perjury and subornation of perjury. Regular agents were employed, who were authorized to offer men \$50 each to make entries for such land and to execute a deed of the same, the entry men rarely knowing to whom they transferred the land.

The parties who now claim the land made no attempt to contradict the testimony offered by the Government relative to the fraudulent character of the entries, or to show that the entries were made in good faith.

The records of Humboldt show that the land embraced in about three hundred and sixty entries under the Act of June 3, 1878, amounting to about fifty-seven thousand acres, has been conveyed to the Trustees of the Humboldt Redwood Company, composed of Scotch capitalists, and other parties, citizens of the United States, associated with them. The timber alone on the land was estimated, by one of their associates in the venture, who is a timber expert of great experience, to be worth \$11,000,000.

would be much more in accordance with justice, both to the purchaser and to the seller, and would, besides, put a check on indiscriminate speculation.

The establishment of some system to regulate the sale of timbered lands and to protect our mountain forests, is of so great importance to the future welfare of the State, that it cannot, with safety, be much longer delayed. That the State must have administrative control over her forests is a foregone conclusion, and until this is accomplished, little can be done towards protecting the forests.

The dire results following the indiscriminate felling of forests in the Eastern States should serve as a lesson by which the people of California should profit, and guard their own forests. But this end can only be obtained by the diffusion of knowledge on the subject among the settlers and citizens of the State, many of whom, from long familiarity with forest impositions and outrages, have grown callous on the subject.

The adoption of a plan somewhat similar to that now in vogue in some of the provinces of Canada* would undoubtedly prove beneficial, not only to the forests, but to the treasury of the State.

Lands chiefly valuable for the standing timber upon them could be leased for a period of years, the time in each case being sufficient to allow the lumbermen to get out all of the large-sized trees, and then reverting to the State again, could be given a rest of say twenty or thirty years, to allow the young trees to grow to a marketable size and a new growth of seedlings to come up. This plan would not only prevent speculators from gaining the control and possession of timber lands, but would present to bona fide lumbermen opportunities of securing choice timber without being compelled to pay for land which, in most cases, is of no intrinsic value to them. Timber lands would thus become a source of continued revenue to the State, and would more than pay for their protection.

THE PREDOMINANT VALUE OF THE FORESTS OF THE SIERRA WATERSHED.

Nature has been most bountiful to California in many ways, but in none more so than in her wise provisions for providing the chief agricultural portion of the State with an ample water supply. The Sierra Nevada range of mountains in California are about four hundred and fifty miles long and sixty-five miles wide. Lying in the extreme eastern portion of the State, they form an immense watershed, dependent on which is nearly our entire river system for its source of supply. Nearly the whole width of the range is taken up by its western slope, which descends gradually from its extreme heights of fourteen thousand four hundred and fifty feet and fourteen thousand eight hundred and eighty feet (Mount Shasta near its northern, and Mount Whitney near its southern extremity) to an elevation of four hundred feet above the level of the sea. At present we have to deal only with the most northern half of the range, and hereafter, in alluding to the Sierras, it will be understood that only that portion north of the Mokelumne River is meant.

* Mr. J. K. Ward, in a very interesting article on "Lumbering in Canada," says: "The different provinces of the dominion make the regulations and conditions on which the timber lands can be worked. In Ontario and Quebec vacant territory is usually sold by auction (in blocks varying in size from one to fifty square miles) at prices ranging from \$2 to \$500 per mile. In addition to this the lessee pays \$2 annual ground rent per mile, and also a stumpage on all timber cut on the territory occupied.

"Each province has its tariff of prices. In Ontario red and white pine are subject to 1½ cents per cubic foot. Other woods vary in price: pine, basswood, and cottonwood saw-logs, 15 cents per two hundred feet, board measurement; walnut, oak, and maple logs, 25 cents per two hundred feet; hemlock, spruce, and other woods, 10 cents per two hundred feet; railway timber, knees, etc., 15 per cent, ad valorem."

These mountains are generally covered with an abundant forest growth, and contain the most valuable timber lands outside of the redwood belt. The west slope of the Sierras may, for convenience of distinction, be divided into three belts. The upper, or mountainous belt, including all the territory above an imaginary zone, at an elevation of four thousand feet; a middle belt, between four thousand and two thousand feet elevation; a lower belt, extending from the bottom of the middle belt to the valley land below.

THE LOWER BELT.

We will first take up the lower belt, which includes nearly all of the territory spoken of as the foothills of the Sierras, and which differs entirely from the other two belts in its topography, climate, and natural resources. Commencing near the central part of Shasta County, this belt continues nearly in a straight line through Tehama, Butte, Yuba, Nevada, Placer, El Dorado, and Amador Counties, embracing at least six thousand five hundred square miles, or four million one hundred and sixty thousand acres of land. It is more or less covered with a timber growth consisting of oak, pine, buckeye, manzanita, and chemical. The oaks are represented by *Quercus lobata* (California white oak), *Quercus Douglasii* (Blue Douglas oak), *Quercus chrysolepis* (Golden Leaf Cañon live oak), and *Quercus Wislizeni* (highland live oak). Of the pines, the *Pinus Sabiniana* (Digger, or nut pine) is, with an occasional exception, the sole representative. This tree grows to a height of forty or fifty feet and is from two to three feet in diameter, and is generally found in scattered groups of six or eight, among scrubby white oak, or thickets of manzanita and brush. In fact, throughout the foothill region the trees grow at a considerable distance apart, and, except from a distance, bear but little resemblance to a forest.

This lower or foothill belt is fast becoming famous as a fruit and vine region, and it will not be many years before the greater portion of it will be covered with orchards and vineyards, and what timber growth it now possesses will be cut for fuel and fencing. Olives also thrive among these foothills, and, with the orange, are already pressing hard upon those raised in the southern counties for the precedence.

There is no doubt but that this region is much more valuable for agricultural purposes than for the timber on it, and that it would be the height of folly to attempt to preserve this timber growth to the detriment of immensely valuable interests. This, then, is clearly a case in which the forest growths are of no economic value to the State, and we may look forward without alarm to the time when they will entirely disappear from this region.

THE MIDDLE BELT.

This belt includes all of the territory between the imaginary zones of two thousand and four thousand feet elevation, and on the west slope of the Sierra varies in width from ten to forty miles, with a general average breadth of fifteen miles.

Ascending past the lower margin of this belt, the yellow pine first greets you, making its appearance among the oaks and Digger pines, which are common also to this belt. It is a worthy forerunner of the forest monarchs to be met with higher up the range. Appearing to be able to endure all climates, and to subsist on most soils, it has the most extensive range of all conifers in the Sierras, extending from the lower boundary of the middle belt to the upper limit of the timber line. The yellow pine is nearly as tall as the Sugar pine, and ranks next to it as a lumber tree. Throughout

the Sierra forests it is the most common species, and is easily distinguished by its bark, which is arranged in massive plates four or five feet long and a foot and a half in width.

The *Jeffreyi* variety of this pine (called black pine) reaches its best state of development in the northern part of the range, especially in the vicinity of Mount Shasta. It is this variety also which is found in a dwarfed form upon stone-ridden ridges and upon rocky and volcanic soils.

The knobby cone pine (*Pinus tuberculata*) is also to be found in this belt, especially in the vicinity of Mount Shasta, where it reaches its greatest height, often one hundred feet. Generally along the west slope of the Sierra it is thirty or forty feet high, and grows in the midst of chaparral, or on sunny hill and cañon sides, and although not extensively represented, grows quite densely wherever it is found. In this belt the Douglas spruce (*Abies Douglasii*), commonly known as red or yellow fir, attains its finest development, often reaching a height of two hundred feet, and a diameter of six or seven feet. It is a long lived and hardy tree, growing in most soils, and is scattered throughout the pine belt, below an elevation of eight thousand five hundred feet. It is the most valuable of the spruce family, and ranks next to the yellow pine as a lumber tree.

The Incense Cedar (*Libocedrus decurrens*) makes its first appearance in this belt, nearly always associated with the yellow and sugar pine, but never forming extensive groves. Under favorable conditions it often ascends to an altitude of seven thousand feet, but it flourishes and grows vigorously between three thousand and six thousand feet, seemingly impartial to the nature of the soil. The largest trees are about one hundred and fifty feet high and seven feet in diameter.

The California nutmeg tree (*Torreya Californica*) is found along the streams and in the gulches throughout the middle belt, attaining its fullest development at an elevation of about four thousand feet. It is a small evergreen tree, generally about thirty feet high, rarely growing in clusters, and never forming extensive groves, but rather appearing here and there among other growths, and is not largely represented. The wood is very firm and elastic, and when dry is sweet scented. Its timber is very durable, but the scarcity of the tree prevents it from being of much economic value.

Half way up this belt (three thousand feet) the sugar pine (*Pinus Lambertiana*) is first seen—the monarch of the Sierra, and the most valuable pine in California.

Towering above its neighbors, the sugar pine has a majestic bearing entirely its own, and even in its associates seems to have chosen the more worthy dwellers of the forest, as the yellow pine, Douglas spruce, and white silver fir (at higher altitudes), are its constant companions.

Extending from an elevation of three thousand feet to one of nearly eight thousand feet, it attains its finest development at five thousand feet, full grown trees being over two hundred feet in height, and from six to eight feet in diameter. One specimen seen near Hams Station, in Amador County, was thirteen feet in diameter, and nearly three hundred feet high. Although generally associated with the growths previously mentioned, when it represents the smaller percentage of the trees, it is quite often found growing in belts where it forms the back of the forest, especially on deep soiled mountain sides and favorably located ridges.

The sugar pine has a smooth, round, and column-like trunk, usually without limbs for two thirds of its height, when its long and heavily fringed arms stretch out, sometimes being forty feet in length.

It derives its name from the fact, that where wounds are made, by ax, fire, or other means, that a sugar exudes in the form of crisp, white crystals, which are very sweet to the taste, with scarcely any pine flavor.

The sugar pine is the most valuable lumber tree of the Sierras, and will be felled wherever found, and as it is but slightly represented among the young growth of our coniferous forests, and is of very slow growth, it is simply a matter of time, under present conditions, when the sugar pine will have disappeared entirely. This belt is destined to become more or less stripped of its forest growth, the upper portion for lumbering purposes, and the lower for fuel, fencing, and lumber.

Many of the smaller creeks serving as feeders to larger streams, either have their source in this belt, or are dependent upon the watersheds of it for their supply, and thus while the preservation of a part of the forests of this belt is not of as much importance as the protection of those around the head-waters of rivers in the upper belt, it is still of sufficient moment to justify legislation in its interest.

THE UPPER BELT.

The upper or mountainous belt includes all the territory above an elevation of four thousand feet, and contains the finest coniferous forests in the world. This belt also forms the great watershed of the Sierras, dependent upon which are our principal rivers for their constant supply.

The lower margin of the belt differs but little from the upper half of the middle belt, the Digger pine being the only conifer which does not cross the boundary line.

From an elevation of four thousand five hundred feet to one of eight thousand five hundred feet, extending along the entire length of the Sierras (above the Mokelumne River), lies the grand coniferous forest of California. When viewed from a distance, it presents the appearance of a gloomy and dense mass of timber, but upon entering its territory the openness of the growth and the absence of underbrush is a most striking feature, appearing as though these grand forest monarchs needed an abundance of breathing space, and could not tolerate minor growths even around their feet. The lower portion of this forest is composed chiefly of pine, both yellow and sugar, then as the middle elevation is approached the firs are about equally represented, and become more numerous as you ascend, the sugar pine gradually disappearing. The beauty of these magnificent forests of pine and fir has been so often described that further mention would be superfluous. Next to the pines, the firs (including all lumber called fir) are the most valuable, as well as beautiful, trees in the Sierras. The white silver fir (*Abies* [*Picea*] *concolor*) grows between the elevations of three thousand and eight thousand feet, but seems to prefer an altitude of four thousand to five thousand feet. Standing over two hundred feet in height, with a diameter of from three to eight feet, its symmetrical white trunk free of limbs for fifty to one hundred feet, and crowned with a graceful top of living green, it is a most stately and beautiful tree. Its wood ranks high as valuable lumber, and is largely used for the inside finish of houses, for butter tubs and packing cases, etc. Owing to its great strength and power of resistance under pressure, it is well adapted to the construction of bridges, use in mines, and wherever great stiffness and strength is desired. As it does not rot when partly buried in earth, holds spikes well, and outlasts any other wood, it makes the best of railroad ties. It is well distributed throughout the Sierras, where it is generally called simply white fir.

The grand silver fir (*Abies* [*Picea*] *grandis*), also called white fir, is very closely related to the *Abies concolor*, and in size and grandeur resembles it. It extends over the entire length of the Sierras at an elevation of from five thousand to nine thousand feet, and is more noteworthy on account of its lofty and stately appearance than for the quality of its lumber. The wood is soft and white, and most excellent for an inside finish, but when placed in contact with the ground rots very quickly. Unlike the *Abies concolor*, it has a very noticeable odor, which unfits it for many of the uses of the former. As a lumber tree it is but little thought of by lumbermen, and consequently is seldom felled.

The noble silver fir (*Abies* [*Picea*] *nobilis*), generally called spruce and red fir, is, like all the firs, a grand and stately tree, attaining a height of nearly three hundred feet, and a diameter from six to ten feet. It extends over the entire length of the Sierras at an elevation of from five thousand to nine thousand feet, and in the vicinity of Mount Shasta forms large forests. The immense trunks are of a dark, cinnamon-red color, and the fan-like green branches are silver-lined, growing very densely and with a wide spread, nearly to the top. Closely associated with this tree, but more commonly represented, is the variety *Magnifica*, the magnificent red silver fir (known as red fir). It has the same range as the *Abies nobilis*, which it resembles in appearance, and even exceeds slightly in size. Its foliage is somewhat coarser than that of the *nobilis*, and is of a silvery blue rather than a silvery green tint. Both varieties flourish in deep snow, over which their dense foliage acts as a protector from the sun's warm rays. Their wood is used largely for fuel, but with the exception of coarse lumber, made chiefly from the *Magnifica* variety, they are never used by lumbermen. When felled and left to lie upon the ground, they rot very rapidly.

The Pacific silver spruce (*Abies Williamsonii*), commonly called spruce, is a strikingly beautiful tree, and the most silvery of all the conifers. It is found on the summits of the Sierras, at an elevation of from seven thousand to ten thousand feet, a fine sturdy tree from one hundred to two hundred feet in height, and from five to nine feet in diameter. The trunk resembles that of the sugar pine, and is often clear of branches for eighty or one hundred feet. It is generally associated with the firs, and like them, is a snow-loving tree. Where accessible it is cut considerably for lumber.

The tamarack pine (*Pinus contorta*), generally called tamarack, and var. *Murrayana* (called pitch pine) extend over nearly the whole range of the Sierras, and forms the bulk of the forest above the fir belt. Growing at lower altitudes on damp flats, it climbs the moist slopes of mountain ranges, grows along the banks of elevated creeks, and in the interior regions of the Sierras grows abundantly on dry soils, generally replacing other species destroyed by fire. A small tree of twenty to forty feet in height at lower elevations, it reaches in the higher Sierras a height of over one hundred feet. The bark is rich in a turpentine moisture, and consequently catches fire readily, vast numbers of this tree being thus destroyed. The wood is light and strong, but not durable, and is used chiefly for fuel.

The Mountain pine (*Pinus monticola*) makes its first appearance on the upper margin of the fir belt as a scattered growth, but gradually increasing in numbers until, at ten thousand feet, it is the prevailing tree. It is a hardy and long lived tree, gaining in size and strength just where other trees weaken and disappear, and at its best development is nearly one hundred feet high.

The dwarf pine (*Pinus albicaulis*) is first met at the upper margin of the fir belt. It is a small tree from fifteen to thirty feet high, and grows

up the slopes of high peaks in a kind of straggling manner, until at an elevation of eleven thousand feet it degenerates into a low bush. It forms the edge of the timber line.

The *Juniperus Occidentalis* (juniper or red cedar) grows from an elevation of seven thousand feet to one of ten thousand. Apparently seeking the baldest and most rocky mountain slopes, it is the most weather beaten appearing tree in the Sierras. Frequently over seven feet in diameter, and not more than twenty feet in height, it looks more like a dismantled stump than a tree. The wood is soft, close-grained, and light, and is valuable for a great many uses.

Intermixed with the larger growth of the upper belt are numerous smaller species, the most important being madrona, laurel, aspen, birch, and mountain mahogany. These trees are used only for fuel, but the madrona and laurel are worthy of a better use, and although their merits are not appreciated now, time will discover their value.

That the lower portion of this upper forest belt must finally be denuded of its timber, is not to be doubted. The forests of pine will be the first to go, and as the demand for lumber increases, the firs will probably follow. The topography of a country is a most important factor in regulating the climate, flow of streams, and other conditions.

It is generally known that mountain forests exercise a great influence over the flow of streams by preventing the sudden evaporation of snow, etc.,* and that most disastrous results follow their removal—such as mountain torrents, periodic floods and droughts, and many other disasters.† The great watershed of the Sierras supplies and regulates the flow of nearly all the rivers in the State, and it is upon the rivers that the greater part of the agricultural land is dependent for irrigation. The people of California appreciate the worth of water, and, to a certain extent, attempt to protect the rivers. A law was passed prohibiting the filling up of certain rivers with debris, thus putting a stop to hydraulic mining. If a minor evil is so readily understood and corrected, why should we shut our eyes to a threatening disaster, compared with which, the first sinks into insignificance? Strip these watersheds of their forest covering, and the prosperity of California is at an end; so to prevent such a happening, it is of the utmost importance that steps should at once be taken to protect our forests. It is a very simple matter to cut down trees, and it can be done in a short while, but it takes years to grow them, and to replace a forest which is cut off in ten years would require at least two hundred years of protecting care.

* Ebermayer has, as the result of trustworthy meteorological observations on forestry, arrived at the following conclusion: "If, from the soil of an open space, one hundred parts of water evaporate, then from the soil of a forest free from underwood thirty-eight parts would evaporate, and from a soil covered with underwood only fifteen parts would evaporate." (Ander's House Plants and Sanitary Agents.)

† Dr. H. Rogers, of Mauritius, in a report issued by him in 1871, on "The Effects of the Cutting Down of Forests on the Climate and Health of Mauritius," says: "Still in 1854 the island was resorted to by invalids from India as the *pearl* of the Indian Ocean, it being then one mass of verdure. When the forests were cleared to gain space for sugar cultivation, the rainfall diminished even there; the rivers dwindled down to muddy streams; the water became stagnant in cracks, crevices, and natural hollows, while the equable temperature of the island entirely changed; even drought was experienced in the midst of the ocean, and thunder showers were rarely any longer witnessed. The lagoons, marshes, and swamps along the seaboard, were no longer filled with water, but gave off noxious gases; while the river waters became impure from various refuse. After a violent inundation in February, 1865, followed by a period of complete dryness, fever of a low type set in, against which the remedies employed in ordinary febrile cases proved utterly valueless. From the waterless sides of the lagoons pestilential malaria arose, exposed to which the laborers fell on the field, and in some instances died within a few hours afterwards."

Authorities upon the subject place the proportion of forest covered land necessary to the well being of a country, at one fifth of its entire area. While it is not proposed to attempt to reserve any such proportion in this State, there is most pressing need to protect the forests covering the watersheds at heads of streams. If this was done, the most of the danger would be checked, and at small price.

FOREST FIRES.

Here we have to deal with a destructive agent whose devastating course it seems impossible to check or prevent. Consuming each year thousands of acres of fine timber, endangering and often destroying the property of settlers, menacing the homes of all those who live in timbered regions, the forest fire, year after year, continues its ruinous course, unrestrained by the law, and unheeded by the majority of the people.

The law in California pertaining to forest fires reads as follows:

SECTION 384 (Penal Code). Every person who willfully and negligently sets on fire, or causes or procures to be set on fire, any woods, prairies, grasses, or grain, on any lands in this State, is guilty of a misdemeanor, and is punishable by fine not exceeding five hundred dollars, or imprisonment not exceeding six months, or by both such fine and imprisonment.

The State Board of Forestry has caused to be posted throughout the timbered regions of the State, notices setting forth the above law, and inviting citizens to report any violation of it, offering a reward ranging from twenty-five to two hundred dollars for the first information in any instance on which an action at law can be based, but with very indifferent success. It is true that these notices have served as a warning, and have been most beneficial in informing the settlers of timbered districts, and especially sheepherders, of the existence of such a law, thereby making them more careful in building fires in the woods; but they have not succeeded in inducing any one to come forward to present the evidence requisite to convict the starter of a forest fire. It is hardly reasonable to expect that any settler will inform against his neighbor, and the shepherd is generally so far removed from any habitation that his crime rarely has a witness. In regions where the timbered lands are more or less owned by corporations or private individuals, great care and precaution is taken to prevent and check fires, and the owners of such lands vigorously condemn the Government for not exercising sufficient supervision to prevent forest fires. But when devastating fires sweep over wooded lands not suitable or available for cultivation, and belonging to the Government, the average citizen or settler in the neighborhood remarks, "What a shame to destroy such fine trees—the Government ought to put a stop to these forest fires," never reflecting for a moment that it is the selfish indifference and want of action of himself and his similar feeling neighbor that renders the Government powerless to check this great evil.

Along the Yellowstone River, in Montana, I have seen settlers ride for a mile or more after careless campers who had left their camp fires burning, and compel them to return and extinguish the smoldering fire. This was done to prevent the bunchgrass from taking fire and spreading for miles over the valley or prairie, endangering the settlers' houses and crops. It is true that the motive was oftentimes one of self interest, but so strongly was every one imbued with the spirit of preventing prairie fires, that those who had nothing to lose showed as much zeal in the cause as the man whose home and all was at stake. If the citizens of California living in wooded

districts would show a little of this feeling and interest, large and disastrous fires would frequently be prevented or checked before doing serious damage. There is no reason why camp fires should not be extinguished when the camp is abandoned, and if campers knew that all citizens took a personal interest in having this attended to, and that they (the campers) were liable to fine or imprisonment for their neglect—for leaving a fire burning in a thickly wooded country should be made a criminal offense—they would be extremely careful to assure themselves that the fire had been put out before being abandoned.

The most disastrous fires, from a forest point of view, are unquestionably those started by the sheepherders who drive their flocks into the higher regions of the Sierras to feed during the summer months. These men, ignorant and shiftless, as a rule, do not comprehend the magnitude of the injury inflicted upon forests by fire, and looking upon our vast mountain ranges as "no man's land," think that it does not matter in the least how they treat them. A great many of these herders, especially those who return year after year to the same grazing regions, set fire to the undergrowth upon leaving in the fall, so as to improve the herbage of the following spring and summer. Removed as they are from all human habitation, they are free to commit whatever depredations they please without the least fear of detection, for when a forest fire occurs in the region which they are occupying with their sheep, although the presumptive evidence may be strong as to the origin of the fire, still there were no witnesses to the deed, and no one can be held responsible. If our mountain ranges are to be continually used as a free pasturage for sheep and other animals, it would appear that the only method that can be adopted to check forest fires is to divide the heavily timbered mountain ranges into districts, each of which shall be supervised by a forester, or guard, whose duty it shall be to acquaint himself with the location and the name of the owner of each band of sheep, cattle, or horses that may enter his district, and then in case of any herder setting fire to the woods, his employer should be held responsible for all damage done. This plan would, of course, necessitate the control of the forests being in the hands of the State, and until this is accomplished, there seems to be but very little hope of preventing fires in our mountain forests.

An idea very prevalent with the majority of the people, is that forest fires only destroy the underbrush and young trees, and that the larger and full grown trees are uninjured, or at most only scarred. This belief is very erroneous, as I have seen, notably in Shasta County, trees two hundred feet in height, blazing clear to the top, and dozens of them burning at the same time, and any one traveling through the Sierras cannot fail to notice the large number of charred and half burned stumps of large trees, often twenty feet high, whose tops have fallen when the trunks were half consumed, and were themselves wholly or partially consumed upon the ground.*

* The "Popular Science Monthly" of September, 1886, published an extract from a private letter of Dr. Heinrich Maye. He says: "The disappointment in regard to forests in Japan which I experienced was keen. The Japanese have sent out many students to Europe to study forestry, and have, therefore, the reputation of possessing forests; but nothing of that; the mountains are bare, and the forests burned down, just as they are in the eastern part of the Rocky Mountains. Americans might take a fearful warning in regard to the future prospect of their great West; only the landscape will be still more desolate there, because the land is so divided into small holdings that no forest will be raised.

Japan is the land of inundations, and the effects of forests upon moisture are here most strikingly illustrated. Every thunder shower sends its whole quantity of water without delay to the rivers and the sea, and within a few hours a mountain valley has seen a dry channel, a raging torrent, and a little brook occupying the same bed; thousands of acres of

These larger fires which consume matured trees, confine themselves entirely to the forests of pine and fir, the trees of which being rich in pitch, catch fire very easily and give out an intense heat. These fires often assume such proportions that the atmosphere at a distance of fifty miles from the scene of the conflagration will assume that hazy appearance caused by dense smoke. In the Sierras, the largest and most destructive fires occur almost invariably in those regions used for pasture. Fires occur more or less frequently near habitations, caused by the carelessness of settlers in clearing land and allowing their brush fires to get beyond their control and escape into the surrounding forest; but they form but a small percentage of the total number. Hunters, and especially Indian hunters, are blamed for many fires, but they are probably not guilty of more than 20 per cent of the charges made against them, and each year sees even this small percentage lessened. The Indians were undoubtedly at one time the chief cause of forest fires; setting fire to immense bodies of woods in order to clear out the underbrush, that they might more easily hunt and capture game; but they have ceased such practices long since, and have become so reduced in numbers, that but small bands, or more often but three or four, hunt in company, and they practice stalking almost entirely. In those districts in which Indians were accustomed to set fires, the discontinuance of that custom has resulted most beneficially to the young forest growths.*

Teamsters freighting over mountain roads are occasionally the cause of fires, either by neglecting to extinguish a camp fire before leaving a camping place, or by setting fire to a windfall which has toppled across the road, from which the underbrush ignites and starts a forest fire.

Our conifers suffer most from fires, and especially the two-leaved pine, or tamarack pine (*Pinus contorta*), which, above the fir belt, forms the bulk of our alpine forests. The thin bark of this tree is so streaked with resin that even the green trees catch fire, and during high winds the flames speedily advance, leaping from tree to tree, and destroying entire forests. Slow and smoldering fires that creep along the ground, feeding on the litter of burs and needles, on arriving at the foot of a tree, ignite the resinous bark, and a flame of fire shoots up to the top of the tree of sufficient heat to kill it, and the bark gradually drops off, and then the branches fall, leaving only the trunk. Miles of territory in the upper Sierras may be seen apparently staked out with bleached spars.

While the injuries done our forests by fires are to be deplored, there appears to be no hope of checking them under the present condition of affairs, and until a general system of protection is devised and put into operation, they will be compelled to suffer.

The following is but one of the many notices of forest fires which are continually appearing in the newspapers throughout the State, and will serve as a sample for the rest:

good land along these numerous mountain streams cannot be cultivated, because the forests are lacking, which would retain the moisture and allow it only gradually to seek the river and ocean. We cannot realize enough the consequences of forest destruction. But even Arbor-Days are only a small remedy; the State alone can own large tracts of successfully cultivated forest land."

*I was informed by Mr. J. M. Davidson, United States Deputy Mineral Surveyor, and an old resident of Scott Valley, in Siskiyou County, that fifteen years ago the entire west side of Scott Valley was almost devoid of young forest growths, owing to the fires set out each year by the Indians. But this practice having been discontinued, and fires occurring only once in six or seven years, the young growth has been afforded an opportunity of maturing, and now forms such a dense jungle that the old traveled trails are impassable.

BURNING TIMBER.

Large Forest Fires Raging in the Santa Cruz Mountains.

SAN JOSÉ, October 23, 1888.

Mountain fires north of Santa Cruz are doing much damage in the woods, and at times are threatening houses. Much timber has been destroyed, and the flames are spreading so rapidly and covering so much territory that considerable alarm is felt. The station house at Wrights and the bridge of the Southern Pacific Railroad have just had a narrow escape. ["San Francisco Daily Examiner," October 24, 1888.]

ILLEGAL TIMBER CUTTING.

Illegal timber cutting has been carried on quite extensively in former years by millmen and others, especially in remote and thinly settled regions, but of late years the shake-makers are the principal depredators.

Millmen were accustomed to cut beyond the boundaries of their claims with but little fear of detection, and with the belief that if they were found out and prosecuted, that they could settle at a very low rate of stumpage. But recent investigations made in this State by Government officials have taught them that such proceedings are attended with considerable risk, and have tended to make them keep within their own confines.*

ANNUAL REPORT OF THE COMMISSIONER OF THE GENERAL LAND OFFICE
FOR 1888.

The shake-makers can be found throughout the Sierras, generally a shiftless set who cannot bear the restraint and superintendence of manual labor in populated districts, preferring rather to lead a free and careless life in the mountain forests, working only when they feel so inclined or are pressed to it by want of food. Scenting out a Sugar pine as easily as a terrier does a rat, they visit every accessible district in the Sierras, and a pile of shakes is often the only visible sign that any human being resides in these mountain solitudes. They are often called, perhaps aptly, forest pirates; and as, from force of circumstances, they are compelled to prey entirely upon Government and State lands, they destroy considerable of our public sugar pine timber, especially as they fell about three times the number of trees that they make use of, often cutting down five or six before finding one suited to their purpose. Although this practice of making shakes is generally condemned, and is certainly illegal as carried on, it has become so established a custom that no one thinks of interfering, and as to lodging a complaint against a shake-maker, public opinion is against it; for, like the Irish, the American people hate an informer.

Early settlers have always, and most justly, helped themselves to whatever timber offered to build their cabins and fences and for fuel. In thinly settled districts, timber upon Government land has been invariably looked upon as public property to be had for the cutting, and as long as it was put to private and local uses, no thought was given to it, but as soon as it became a source of profit to special individuals, and was gone into on a large scale, the criminality of the practice was made apparent.

It is not the injury done by a single shake-maker that gives rise to complaint, but the general destruction caused by the hundreds who are engaged in this business. Happily it is a practice that a careful supervision over

* Among the important cases in which suits have been or soon will be recommenced on the agents' reports, are the following: In California two against lumber firms for \$37,000 and \$732,000, respectively. The suit against the Sierra Lumber Company to recover \$2,000,000 for the lumber unlawfully cut from public land is still pending.

our forests will abolish, as the shakes will always serve as proof of the crime.

RAINFALL AS AFFECTED BY FORESTS.

The subject of the influence of forests upon meteorological conditions, although of great practical significance, is one upon which there is such a vast diversity of opinion, the conclusions arrived at being to a great extent inferential, that it is most difficult to arrive at the truth.

Forests are certainly instrumental in producing light rains and dews, but it is hardly reasonable to suppose that they affect the rainfall, unless they are situated upon high mountains; for, according to well known meteorological principles, rain is formed at a distance of from one to two miles above the surface of the earth.

Any one interested in the subject may find the appended precipitation table of interest.* It was compiled from data contained in State Engineer Hall's report for 1886, "Physical Data and Statistics of California."

PRECIPITATION TABLE—SHOWING THE AVERAGE OF RAINFALL AND MELTED SNOW.

LOCALITY.	Elevation.	Years Observed.	Average of Total Precipitation.
Marysville, Yuba County.....	67	14	16.56
Chico, Butte County.....	193	14	20.32
Tehama, Tehama County.....	220	14	13.85
Rocklin, Placer County.....	249	14	19.13
Ione, Amador County.....	287	6	19.65
Red Bluff, Tehama County.....	307	13	25.27
Redding, Shasta County.....	565	10	36.79
Smartsville, Yuba County.....	800	9	33.12
Delta, Shasta County.....	1,138	2	63.50
Auburn, Placer County.....	1,363	14	32.74
Placerville, El Dorado County.....	1,857	9	45.62
Colfax, Placer County.....	2,421	14	44.81
Georgetown, El Dorado County.....	2,500	12	59.18
Nevada City, Nevada County.....	2,500	19	56.96
Berryvale, Siskiyou County.....	3,462	2	28.76
Alta, Placer County.....	3,612	14	43.64
Fort Bidwell, Modoc County.....	4,647	18	20.07
Mumford Hill, Plumas County.....	4,900	6	65.24
Emigrant Gap, Placer County.....	5,230	14	51.73
Bowman Dam, Nevada County.....	5,400	13	73.33
Boca, Nevada County.....	5,531	13	17.35
Truckee, Nevada County.....	5,819	14	29.53
Cisco, Placer County.....	5,939	14	57.41
Summit, Placer County.....	7,017	14	47.93

PLANTING FOREST TREES FOR PROFIT.

The cultivation of forest trees in California is as yet in its infancy, and it will take many years of patient endeavor to teach the people of the State that forest trees may be grown with profit. What trees have been planted have been almost exclusively for shade and ornament, and, while not abundant in any one locality, would, in the aggregate, form a very respectable forest.

Profits from tree planting are too far in the future to please the average farmer, who wishes to reap the benefits of an investment as quickly as possible, and in many cases is dependent upon an early return for his livelihood. Whereas our native forest trees are of slow growth, taking from sixty

* By referring to the forest maps, the location of each station as regards forest surroundings can be ascertained.

to one hundred and fifty years to reach maturity, a species of foreign growth has, of late years, been introduced into our State, which promises to solve affirmatively the question, "can forest trees be grown with profit," and that species is the eucalyptus, or, as it is often called, the Australian gum.

This tree seems to possess all of the requirements in which our native species are lacking, and, while not as valuable a lumber tree as our conifers, its special virtues commend it as the most profitable tree to plant.

Its chief recommendations for this purpose are its exceeding rapidity of growth, its remarkable adaptability to various soils and climates, the excellence of its wood, both for timber and fuel, together with the various other economic uses to which it is put. Most productive of forest trees, it requires absolutely no attention save that of planting out, and does not wear out the patience of generations in attaining an available growth of timber.

In Australia this family is found growing under all conditions of soil and climate, from the hot and arid desert to the tops of mountains at an altitude of five thousand feet, and there is no apparent reason why the barren area of this State should not be made productive and beautiful with forests of this tree.

Among the multifarious growths of the eucalyptus, many different varieties of wood are found, supplying lumber for all conceivable purposes. Although it is the most important and widely distributed forest tree in Australia, it was not until it had been transplanted in California that one of its most useful and valuable properties became known, and then it was due to accident. A gentleman (Mr. Downie) used in the steam boilers of his mill, water that had been strained through leaves of the blue gum tree, and he subsequently noticed a remarkable falling off of the troublesome scale that had incrustated the interior of the boilers. Attributing this curious fact to the right cause, he formed a company for the extensive preparation of an extract from the leaves, which was placed upon the market as the Downie Boiler Incrustation Preventive and Remover, and so great was the success which it met with among those using steam boilers, and so quickly did its fame spread, that now it is in use not only throughout California, and upon steam vessels which enter the harbor of San Francisco, but throughout the United States and Europe, and by the navies of the world.

Large quantities of eucalyptus oil, composed largely of an essential oil called Eucalyptol, is produced as an incidental to the preparation of the boiler fluid, and is used in surgery as an antiseptic, and for various other purposes. The wood which has been accumulated by this boiler fluid company in the vicinity of Oakland, by the felling and topping of the blue gum tree, was placed upon the market, and, although at first it brought but one half the price paid for pine wood, it soon came into great demand, especially for steam-making purposes, and now commands a price equal to, and frequently in excess of, that of any other wood fuel.

A forest of Eucalyptus globulus, which was set out near Los Angeles several years since, gave the following results:

Cost of trees at time of planting	\$7 50 per acre.
Cost of setting out	5 00 per acre.
Subsequent cultivation	5 00 per acre.
Annual rental of land	3 00 per acre.
Or, for seven years	21 00 per acre.
Making the total cost, at the end of seven years	38 50 per acre.

Now, as there were ninety-seven acres of trees planted, the total cost at the expiration of seven years was \$3,734 50. The value of the trees

was as follows: Amount of wood on the land, thirty-five cords per acre, or \$66 50 per acre for seven years, which, at \$3 per cord, was worth \$105; or \$10,185 for the entire ninety-seven acres. This gives a net profit of \$6,450 for ninety-seven acres in seven years, which is an annual profit of \$9 50 per acre. In many localities, the cost of putting out the trees and the rental of the land would be much less, and oftentimes the growth would be much greater. It may be readily seen, from these figures, how profitable an investment the setting out of the eucalyptus can be made. Wood may be cut from these trees in six years after planting, but if large timber is desired, of course a longer period (say from fifteen to twenty years) is required. Further than this, the trees never die, and it is next to impossible to kill them. They may be cut off so as to leave only a bare stump, and immediately they begin to put forth leaves and branches, and at the end of five years another crop of wood can be cut. So tenacious of life are these trees, that they may be cut level with the ground, and even this heroic treatment will not destroy them.

Besides being the most profitable tree to plant as a pecuniary investment, the Eucalyptus makes a most desirable and effective wind-break, and will, it is claimed, arrest malaria if planted in swampy districts,* while in arid regions it serves as a producer of heavy dews.

We have a large treeless area in California, which will not produce crops without irrigation, and which is looked upon as waste and valueless land, that might most beneficially and profitably be planted with the eucalyptus. This tree will become in time better known, and its value will be more appreciated than at present, and before a great many years has passed, it will be generally distributed throughout the State.

* Mr. A. W. Bennett, writing in "Nature," says: "The effect of the planting of forests in increasing the rainfall is often erroneously reputed to be due to the 'attractive force of the trees' on the moisture in the air, similar to that exerted by a range of mountains; but this supposition he regards as untenable. The mode in which trees mainly act is," he says, "by their roots arresting the rainfall that would otherwise escape by the natural drainage of the country; the combined forces of capillarity, osmose, and transpiration then cause the ascent through the tissues of the tree of the water thus arrested, and the larger portion is eventually given off into the air through the stomata of the leaves. In this way a forest tree will in a very short time give off into the air its own weight of water, which is again deposited as rain or dew. It is quite possible, however, that the effect of the planting of trees may be *apparently* the reverse of this in swampy regions without natural drainage. The water then accumulates in the soil; and if the country is bare of timber trees and the sun powerful, a rapid decomposition takes place of the herbaceous vegetation, with consequent emanation of malarial vapors. If trees be planted, the effect is to supply natural drainage; the accumulation of water in the soil, and the consequent noxious effluvia, will be diminished, and finally prevented, and the atmosphere rendered, if not drier, at least more wholesome."

DESCRIPTION OF COUNTIES.

SISKIYOU, MODOC, LASSEN, PLUMAS, SHASTA, BUTTE, TEHAMA, PLACER,
SIERRA, NEVADA, AMADOR, EL DORADO.

SISKIYOU COUNTY.

Lying immediately north of Trinity and Shasta Counties and extending to the Oregon line, and reaching from Modoc County on the east to Del Norte and Humboldt Counties on the west, Siskiyou has the distinction of being the most elevated county in the State. Covering an area of six thousand square miles, principally consisting of high mountains and broad plateaus, and far removed from railroad communication, the chief industries have been mining and stock-raising, but with the advent of the California and Oregon Railroad, which has lately been completed, and which runs through the central part of the county from north to south in close proximity to the magnificent pine forests in the southeastern part of the county, lumbering will soon become a leading industry.

The Sierra and Coast Range of mountains meet in this county at Mount Shasta, whose snow-capped peak serves as a landmark for Northern California.

There are two distinct watersheds in this county, formed by the Coast Range in the northwestern part and draining into the Klamath River, and by Mount Shasta and spurs of the Sierras in the southern part draining into the Sacramento River, which rises near the southwest base of Mount Shasta.

The Coast Range, locally known as the Salmon and Siskiyou Mountains, is situated in the western and northwestern part of the county.

The Salmon Mountains are from six thousand to ten thousand feet above the level of the sea, their tops being covered with perpetual snow, and are the most desolate, wind-swept, and storm-ridden mountains in the State. Accessible only by trails, they are never visited except by hardy prospectors, or by herders seeking grazing ground on their eastern and more protected slopes. West of these mountains, and south of Independence Creek, is a wild rugged region with but little vegetation. On the table lands, at an elevation of about eight thousand feet, there is a small scattered growth of stunted yellow and sugar pines, and red fir; while on the summits of the range, white and silver fir of small size, and mountain larch, can be seen. Chestnut, ash, and alder grow along the streams, and a few black and white oaks are scattered over the broken hillsides. North of Independence Creek considerable madrona grows on the low hills.

East of Salmon Mountain range and extending north over the Marble Mountain Range and Scott Bar Mountain, is a good belt of timber, consisting of red fir, yellow and sugar pine of good size in the southern part of the belt, and adding white and silver fir, and cedar on Scott Mountain and Marble Mountain Range. On the west side of Scott Valley there is some first class timber, chiefly red fir, but in consequence of the mountainous

character of the country, and the difficulty in getting it out, very little has been cut. Black and white oak are among the other growths on the east slope of the range, and alder, ash, and chestnut grow along the rivers.

In Scott River Valley small cottonwoods seem to flourish along the streams, and at Fort Jones the black locusts, planted on either side of the principal street, thrive as well as those growing in more southern towns.

On Scott Bar Mountain the timber reaches a large size, especially the yellow pine, which is frequently two hundred feet high and nine feet in diameter. The cedar also is well represented here.

These ranges of mountains act as a wind-break for the country east of them, and as a watershed for Scott River, and owing to their inaccessible character, will probably never be stripped of their timber.

Deadwood Mountain Range and Humbug Mountain are fairly well timbered with yellow pine and red fir, extending up to the Klamath River, the best timber being in the vicinity of Humbug Creek.

Along the Klamath River, west of the California and Oregon Railroad, the black oak prevails, with a good sized madrona growth near the banks.

The country north of the river is taken up by the Siskiyou Mountains, and is better timbered than that immediately south of the river.

Good yellow pine, red fir, cedar, and sugar pine form a scattered growth over these mountains, and are thickly intermixed with black and some white oak.

The black oak here reaches its finest development, and on the mountain benches, at an elevation of two thousand five hundred feet above the river, from Beaver Creek down to Happy Camp, may be seen black oaks five and six feet in diameter, with trunks as straight as a sugar pine, and thirty-five feet to a branch.

On the summit of this range, especially on a high peak locally called Siskiyou Mountain, silver fir of large size grows abundantly. Along the streams there is madrona, ash, alder, and maple.

None of this timber has been disturbed, or is it likely to be, as the mountainous and rugged character of the country unfits it for habitation, and the difficulties in the way of shipping the timber are too great to be profitably overcome.

East of the California and Oregon Railroad there is but little timber black oak along the Klamath, and it is of much smaller size than that lower down the river.

At the point where the Klamath River enters California from Oregon, there is a belt of timber about twelve miles in width, which varying in density, character of timber growth, and width, extends in an almost southerly direction to the Snow Mountain Range, where it meets the northern extremity of the sugar pine belt.

As far south as Goose Nest Mountain (or crater), it consists of very good sized yellow pine, red fir, cedar, and some sugar pine of a fairly thick growth on the average, being quite dense in places.

Southeast of Goose Nest the timber is more sparse, nor is it, as a rule, as large as that last spoken of. Yellow pine, hemlock, cedar, and tamarack form the timber growths, except on the higher elevations, where Silver Fir of a moderate size grows in considerable quantities.

About one mile south of Edgewood begins the great sugar pine belt of Siskiyou. It runs in a general southeasterly direction through Strawberry Valley, and then easterly, along the south base of Mount Shasta, through the McCloud River Valley and to the Fall River Valley. This belt, which consists almost entirely of yellow pine, sugar pine, red fir, and cedar, derives its name from the large percentage of sugar pine which it contains,

and is probably the most valuable sugar pine belt in the State. Made accessible, in the past two years, by the California and Oregon Railroad, it has nearly all been purchased from the Government and the State by speculators and millmen, and already several large sawmills have been erected near the line of the railroad.

MODOC COUNTY.

Modoc County occupies the northeastern corner of the State, is rectangular in shape, and covers an area of four thousand three hundred square miles. The Warren Range of mountains, a spur of the Sierra, runs north and south through the county, at an average distance of fifteen miles from its eastern boundary. These mountains are from six thousand to ten thousand feet above the level of the sea, and are covered with a diversified growth of juniper, yellow and pitch pine, red fir, and mountain mahogany.

This range of mountains has almost its entire width on its western slope, its eastern slope being so precipitous that in many places it presents the appearance of a perpendicular wall. From the southern extremity of the county for forty miles north the timber growth is not well developed, and is rather scattering, tending frequently to grow in widely separated clusters or clumps, is not fit for saw timber, and is used only for fuel and fencing. But above the headwaters of Davis Creek the trees become larger and more numerous, and in the vicinity of Fandango Valley there is enough good saw timber to supply the local need for years to come.

This western slope of the Warner Range is drained by the Pitt River and its tributaries. The Pitt River rises in the northeastern part of the county, near the southern extremity of Goose Lake, and flowing southwesterly passes through a low portion of the Sierra, and forms the principal tributary of the Sacramento River. This river may be said to drain all of the watersheds in Modoc County, except the eastern slope and the northern part of the Warner Range, and the lava bed region in the northern part of the county, all of which is drained by Goose Lake.

West of Goose Lake there is a light growth of yellow pine, red fir, and cedar, forming small groves in the midst of the junipers, which constitute the prevailing growth. This timber is useful for fencing and firewood only.

In the southwestern part of the county, surrounding Big Valley, and extending over the mountainous region northwest of it, is a valuable growth of timber covering about six hundred square miles. It consists principally of yellow and pitch pine, cedar, and red fir, of good size and density, and when a railroad is built through this section, will be valuable for the lumber it will produce.

The best timbered region is immediately northeast of Adin, being the northern extremity of the belt which enters this county from Lassen County. Two sawmills have been cutting lumber here for a number of years, but as only a sufficient quantity to supply the local needs has been felled, the loss is hardly noticeable.

Modoc County is so removed from railroads that the transportation of her lumber to a market has been impossible; but when a railroad does pass through Big Valley and on up to Oregon, as it must some day, lumbering will become a leading industry.

LASSEN COUNTY.

Lassen County lies directly south of Modoc County, and extends from Shasta County on the west to the State of Nevada on the east, covering an

area of four thousand nine hundred square miles. While the main body of Lassen County is but sixty miles in length from north to south, it has a peculiar neck or strip of country extending southward on the eastern border of Plumas County, which gives Lassen an extreme eastern boundary of one hundred miles bordering on the State of Nevada.

Ranging in altitude from three thousand nine hundred and fifty feet at Honey Lake, to nine thousand five hundred and fifty-three feet near its western boundary line, and being made up of mountain ranges, isolated peaks, irregular hills, sagebrush plains, and cultivated valleys, this county presents a very diversified landscape.

The western portion of the county, which is also the timbered portion, is of a lava formation, and is a part of the great lava bed region, which extends from Modoc and Siskiyou Counties down through Lassen, Shasta, and Plumas into Tehama County. Although this lava formation as a general rule is not visible upon the surface of the ground, very little of this western portion of the county is cultivated except in the northwestern part, where the southern portion of Big Valley affords about ninety thousand acres of agricultural land.

This western portion of the county is well timbered, and has, as yet, been very little cut over, and what timber has been cut has been entirely for local uses, the want of cheap transportation preventing it being sent out of the county. Lying upon the east slope of the Sierra Nevada Mountains, the yellow pine naturally predominates among its forest growths, and represents about 60 per cent of all the timber in the county. Red Fir and pitch pine rank next to yellow pine in abundance, and cedar is well distributed throughout the region. These trees are of good average size—from three to ten feet in diameter—and are well distributed over this region, in some townships averaging from fifteen thousand to twenty thousand feet, board measure, to the acre. Sugar Pine, although not so generally distributed as the trees spoken of, is well represented, and reaches a fine state of development. South and southwest of Eagle Lake there is a fine belt of sugar pine, as yet untouched, and in the southwestern part of the county there is a great quantity of sugar pine, which, owing to the difficulty of transportation, has never been cut. In the vicinity of Harkness Peak, and for ten miles east of it, there is a fine growth of white fir, and in the southwestern part of the county, south of township 33 north, is a heavy growth of yellow pine, red fir, spruce, sugar pine, larch, and tamarack, with some willow and aspen around the lakes and along the creeks.

Above township 33 north the timber is of an open growth, and consists of large sized yellow and pitch pine, red fir, and cedar, to which is added juniper, white and black oak as it approaches Pitt River, and is generally distributed in belts over the uplands and ridges, following the contour of the hills. The undergrowth is usually manzanita, with some wild plum. The timber belt extends eastward to Susanville and Eagle Lake, and consists of a more or less heavy growth, at no time sparse, of yellow pine, red fir, cedar, sugar pine, and pitch pine. Along the edges of the belt juniper and mountain mahogany replace the larger growths.

Towards the north the belt reaches to Big Valley, where it narrows and extends around the east side of the valley into Modoc County.

Madeline Plains, an extended, level tract of land in the northern part of the county, having an altitude of over five thousand feet above the sea level, are covered by a dense growth of sagebrush. Extending around three sides of these plains is an irregular range of low mountains or hills, covered with a growth of juniper and mountain mahogany, which is used for fencing and fuel.

The timber in this county has escaped the fearful ravages of fire which have visited the forests on the western slope of the Sierras, but still has suffered to a noticeable extent. The causes of fire have been chiefly carelessness and indifference on the part of those living in the woods, whether sheepherders, hunters, or others.

Nearly the entire timber belt is used as a summer range for sheep, which are driven up over the mountains from Tehama, Butte, and the more southern counties.

There are only two sawmills in the county and they cut only sufficient lumber for local uses, but with the completion of the narrow gauge railroad which is now being built from Reno, Nevada, northward through the central part of the county, lumber will probably be sent to Nevada.

The fine timber in the southwestern part of the county will certainly be turned into lumber before many years have passed and shipped to a market. The greater part of the sugar pine timber has been owned for years by lumber companies or by private individuals, and as soon as the supply of the more accessible regions is exhausted, this section will also be stripped.

Unless the forests are destroyed by some agent at present unknown, Lassen County will never suffer from want of wood and lumber, and will also be able to supply her neighbors with a large amount of building material.

PLUMAS COUNTY.

Plumas County is bounded on the north by Lassen County; on the east by Lassen County and the State of Nevada; on the south by Sierra County, and on the west by Butte and Tehama Counties.

It covers an area of two thousand six hundred and fifty-six square miles, the greater portion of which is between three thousand and five thousand feet above the level of the sea.

Lying in the midst of the Sierras, its scenery is necessarily wild and picturesque, and as the climate is delightfully temperate during the summer months, it is much resorted to by those seeking both rest and recreation.

This county is well watered by innumerable small streams, and the watershed on the west slope of the Sierras is drained by the larger branches of the Feather River and their tributaries.

Several small valleys in the northern part of the county, and Sierra Valley in the southeast corner, constitute about all of the tillable land in Plumas, its chief resource being mining. With the exception of these small valleys, the entire county is covered with a heavy forest growth, which, owing to the lack of cheap transportation, has been but scarcely touched. Whatever timber has been cut has been almost entirely for local uses, and will not average much more than fifteen million feet a year.

The principal forest growths are yellow pine, red fir, pitch pine, sugar pine, cedar, black and white oak, all of which grow to large size, and in places very densely. As fine specimens of yellow and sugar pine, and red fir, can be seen in this county as in any portion of the State, and it is only owing to the inaccessibility of their positions that they have not long since been made into lumber.

The heaviest and thickest growths are generally found on the slopes of the Sierras, but many of the plateaus are covered with magnificent timber, notably the country around Prattville and the Big Meadows.

A considerable amount of territory in Plumas is so high and mountainous that it is not likely ever to be stripped of its timber, but as the supply

elsewhere decreases the greater part of the forests in the county will be felled for lumber.

Fire destroys a great quantity of valuable timber each year; and, owing probably to the apparently inexhaustible supply which is seen on every hand, no steps are taken to check or prevent it.

SHASTA COUNTY.

(East of the Sacramento River.)

That portion of Shasta County east of the Sacramento River is bounded on the north by Siskiyou and Modoc Counties, on the east by Lassen, and on the south by Tehama County. It covers an area of about two thousand eight hundred square miles, the greater portion of which lies in the Sierra. South of Smithson, the country where not cultivated is covered with a scattered growth of oak and Digger pine, with considerable manzanita and chaparral, and along the east side of the Sacramento River a straggling growth of knob-cone pine. This latter pine grows all along the east side of the Sacramento River, nearly as far north as Mount Shasta. Above Smithson, the timber on the east side of the river consists principally of pine and oak, with some red fir, being a scattered growth at first, and increasing in size and density as you go up the river, although hardly reaching a size to fit it for saw timber. The trees grow rather thickly for two thirds of the way up the mountain slope, the summit of which is from two to four miles from the river, and then becomes sparser, and on the east side of the summit are not so dense.

Four prominent peaks mark the Sierra in the eastern part of the county, the higher peak, Lassen, being timbered for little more than one half of the way up, and the others having bold and rugged slopes. The entire eastern part of Shasta County above Smithson may be said to be timbered, numerous little flats and valleys being excepted.

In the northern part the sugar pine belt of Siskiyou County extends quite a distance into Shasta County, and in fact the sugar pine is very well represented throughout the northern and eastern portions of Shasta County.

The principal forest growths are yellow and sugar pine, red and white fir, cedar, spruce, and oak. Heavy timber generally grows on the slopes and table lands on either side of the larger creeks, such as Hat Creek, Soda Creek, Squaw Creek, and Hatchet Creek, but is generally too inaccessible to get to a market.

Near Shingletown is a fine belt of sugar pine, rivaling that of Strawberry Valley in size and density. As the name implies, Shingletown is the home of the shake-makers, and here they are probably more numerous than in any other part of the Sierras.

The Sierra watersheds in this county are important factors in supplying the Sacramento River, as they are drained not only by that river, but by its two most important tributaries, the Pitt and McCloud Rivers. The latter river flows through a wild and rugged region, little visited except by hunters, and abounding in game, especially deer and bear. This region is well adapted for a State park, and, as it is of little economic value to either the citizens of the State or new settlers, it should be set aside for this purpose. Sawmills have been recently erected near the line of railroad in the northern part of the county, and are daily sawing thousands of feet of lumber, which, with that sawed in the eastern part of the county, makes the annual

cut in the neighborhood of twenty million feet. Forest fires have raged fiercely in this county, and have done much damage.

BUTTE COUNTY.

Butte County extends from Tehama County on the north to Sutter and Yuba Counties on the south, and from Plumas County on the east to the Sacramento River on the west.

It covers an area of one thousand seven hundred and sixty square miles, of which six hundred square miles are covered by the Sacramento Valley, the remainder being foothills of the Sierras.

The greater portion of this Sierra watershed is drained by the Feather River and its tributaries, while the Sacramento River and Butte Creek receive the drainage from the west half of the county.

Only the east half of the county, that portion lying in the Sierra foothills, is timbered, the west half being an extended plain, used for agricultural purposes.

The timber on the Sierra foothills is divided into three well defined belts or zones:

The First Belt.—From the base of the foothills to an elevation of two thousand feet above the level of the sea, the growth consists chiefly of white oak, with some black oak near the upper edge of the belt, and Digger pine, which now is much more dense than in former years, as the Indians no longer set out fires, and this pine being a rapid grower, it very soon reproduces itself. This timber is used only for fuel and fencing, and with the settling of this region, which is destined to become the finest fruit and vine district in the county, the timber will gradually disappear.

The Second Belt.—The belt from an altitude of two thousand feet to one of five thousand feet embraces all of the best timber in the county, consisting of yellow and sugar pine, red and white fir, cedar, black oak, madrona, dogwood, nutmeg pine (at an elevation of four thousand feet), and sweet birch (an excellent feed for cattle). Some tamarack grows on low and wet ground, and alder, yew, and quaking asp are found along the streams.

The Third Belt.—This belt extends from an altitude of five thousand feet to one of about seven thousand feet, and is but poorly timbered. The timber becomes scrubby as it approaches the summit of the mountain range, and degenerates to occasional groups of trees, chiefly silver fir. The greater part of this belt consists of bald hills, covered with chaparral, with here and there a few yellow pines. The timber in this county is distributed so diversely that a description is best given by townships.

Tps. 26 N., Rs. 4 and 5 E., are well timbered with yellow pine, red and white fir, Digger pine, sugar pine, cedar, and black oak. The southwestern portion of T. 6 N., R. 4 E., was at one time covered with a fine growth of sugar pine, but it has been mostly cut off. The Abeitine Medical Company's timber lands are located in these townships.

T. 25 N., R. 5 E., is but sparsely timbered with yellow pine, red fir, white fir, cedar, and black oak.

T. 25 N., R. 4 E., is covered with a good growth of yellow pine, red and white fir, cedar, and black oak. There has been fine sugar pine in the extreme northwest corner, but it is mostly cut down.

Tps. 24 N., Rs. 2 and 3 E., and T. 25 N., R. 3 E., have been heavily timbered with yellow pine, red fir, white fir, black oak, sugar pine, and cedar, but they have all been cut over by lumbermen, and the best of the remain-

ing timber is now found on the tops of ridges. There is a considerable growth of madrona, dogwood, and manzanita in these townships.

T. 25 N., R. 5 E., and T. 24 N., R. 5 E., are sparsely timbered townships, the growths being similar to those of preceding townships.

T. 24 N., R. 4 E., is very sparsely timbered east of the West Branch of the Feather River, the growth being chiefly chaparral, but west of the river there is a good growth of yellow pine, sugar pine (some has been cut off), red fir, black oak, and white fir.

T. 23 N., R. 5 E., is a well timbered township, especially on the west side of the North Fork of Feather River. There is a large quantity of sugar pine of good size, and very fine black oak, which thins out and becomes scattering towards the northern part of the township. There is also a good quality of yellow pine, red fir, cedar, and pitch pine.

T. 23 N., R. 4 E., is sparsely timbered with yellow pine, red fir, black oak, cedar, and pitch pine.

T. 23 N., R. 3 E. The edge of the timber belt extends from the southwest corner of Section 7, on a line through Helltown, in this township. There is some sugar pine in the northeastern part of the township, but not much, and the timber, which consists chiefly of black oak and yellow pine, grows scrubby towards the southern part of the township. Considerable white oak in cañons.

T. 22 N., R. 6 E.—The greater part of this township is well timbered, the exception being east of the wagon road running to the Buckeye House. There is a great deal of fine sugar pine, also yellow pine, red fir, black oak, and cedar. The Merrimac Mill is located in this township.

T. 22 N., R. 5 E.—The eastern half of this township, with the exception of the three lowest sections, is well timbered, principally with yellow pine, red fir, and black oak. The timber on the western half is scattering, generally following the ridges.

T. 22 N., R. 4 E.—The timber in this township consists of an average growth of yellow pine, red and white fir, black oak, and madrona. Somewhat scattering.

T. 22 N., R. 3 E.—Only the northeast quarter of this township lies in the timber belt, and the growth is scrubby, consisting of black oak, yellow pine, and red fir. Outside of the timber belt and following the ridges is a fair growth of black oak and Digger pine, with some white oak in the cañons.

T. 21 N., R. 7 E.—The middle belt of this township from north to south is the best timbered, the rest being fairly well timbered, except along the western boundary, where the timber is very poor. It consists of yellow pine, red fir, black oak, cedar, and some sugar pine.

T. 21 N., R. 6 E.—On the eastern side of the Middle Fork of the Feather River the timber is very poor and sparse, but west of the river there is a very good timber growth of yellow pine, red fir, black oak, and sugar pine.

T. 21 N., R. 5 E.—In Sections 1, 2, 11, 12, 13, 14, and north one half of 24 there is good timber, including sugar pine, and within a radius of a mile from Big Bend Mountain the timber is very fair, but the rest of the township has but a scattered growth of poor quality timber. The growths are yellow pine, red fir, and black oak.

T. 21 N., R. 4 E.—Only the northeastern corner of this township is in the timber belt, the rest of the township being well covered with a growth of black oak and Digger pine.

T. 21 N., R. 3 E.—This township is well covered by timber growths. White oak predominates, growing in the valleys and cañons; while the black oak seeks higher elevations and is found along the tops of ridges

and low hills. The Digger pine is scattered throughout the township. There is also considerable alder growing along the creeks.

T. 21 N., R. 2 E.—There is some white oak and Digger pine growing along the sidehills and several narrow valleys in the northeastern part of this township.

T. 20 N., R. 7 E.—North of the South Fork of the Feather River in this township the timber is very good, the sugar pine being equal to that farther north. There is yellow pine, red fir, sugar pine, cedar, spruce, and black oak, the latter being but poorly represented. South of the river the timber is of the same kind, but of a much poorer quality.

T. 20 N., R. 6 E.—The timber in this township, consisting of yellow pine, red fir, black oak, spruce, and white oak, is of a fair quality and density in the northeastern part above Sucker Run and east of the Middle Fork of the Feather River, but the rest of the township has but a very scattering growth.

T. 20 N., R. 5 E.—The timber in this township consists of yellow pine, Digger pine, black and white oaks, of a scattered growth, chiefly along the ridges and creeks. The best timber is in the east central part.

T. 20 N., R. 4 E.—Is generally covered with a good growth of oaks, and in some places there is a dense Digger pine growth.

The foothills rising on the east of the valley land are generally covered with a more or less scattered growth of oaks and Digger pine. The white oak predominates, while the blue Douglas oak and the highland live oak are also well represented. Associated with the Digger pine at low elevations is very frequently found a dense chaparral growth, consisting chiefly of California lilac and manzanita bushes.

TEHAMA COUNTY.

Tehama County lies directly south of Shasta County, and extends from the summit of the Sierra on the east to the summit of the Coast Range on the west, and covers an area of three thousand two hundred square miles.

The Sacramento River flows through the central portion of the county, which forms the northern section of the Sacramento Valley. This valley, or level land, which extends to the foothills of the Coast Range on the west, and to those of the Sierra on the east, covering an area of about two hundred and seventy square miles, is well watered by the numerous tributaries of the Sacramento River, and is covered with a scattered growth of oaks, which adds greatly to the attractive appearance of the landscape.

Tehama County is remarkably rich in her unlimited supply of pure water, which, being formed on the forest-covered mountain ranges on her eastern and western boundaries, flow in well distributed bodies through the county. The most prominent of the streams having their source in the Sierra are Battle, Antelope, Mill, Deer, and Pine Creeks.

In the western part of the county the streams are more numerous, many of them simply serving as feeders to larger streams which drain a large extent of territory. The principal creeks which rise in the Coast Range are Reeds, Cottonwood, Red Bank, Oat, Coyote, Duncan, Elder, and Thornes Creeks. All of these streams are dependent, more or less, upon the preservation of the forests at their sources for a continual and regular supply of water, and the people of Tehama County, appreciative and proud of their fine water system, should certainly respect and protect the initial condition and the natural cause which provide for them such a happy result. About two thousand square miles of this county is taken up by the lower

foothills (below an elevation of two thousand feet), which are rolling and somewhat broken, with a scattered growth of oaks and Digger pines growing upon them. These trees are used only for fuel and fencing, and as this region will in time be devoted to fruit and vine culture, the timber growths will gradually disappear. Along the streams cottonwoods, sycamores, alders, and some white maple trees flourish. The western part of the county, about one thousand square miles, is in the Sierras, and is covered with fine forests of yellow and sugar pine, red and white fir, oak, cedar, and spruce, sufficient to supply for ages even the large population which Tehama County is capable of supporting. About thirty million feet of lumber is felled each year in this county, the proportions being yellow pine, 45 per cent; sugar pine, 40 per cent; spruce and fir, 15 per cent. The total amount of lumber that has been cut in past years is difficult to estimate, but two hundred and fifty million feet would about cover it. Forest fires do considerable damage, but not so much as in former years, as the millmen take great precautions to prevent them, and are often instrumental in extinguishing them when started.

PLACER COUNTY.

Placer County lies south of Yuba and Nevada Counties, north of El Dorado and Sacramento Counties, and extends from Lake Tahoe and the State of Nevada on the east to Sacramento County on the west. It covers an area of one thousand four hundred and thirty square miles, embracing nearly every variety of surface, from the level plains of the Sacramento Valley to the high and rugged summits of the Sierras. Ranging in elevation from less than one hundred feet above the sea level to ten thousand feet above it, most any climate sought for can be found within the confines of the county.*

The western and greater portion of the county, a little more than one thousand square miles, is drained by tributaries of the Sacramento River, while the eastern portion is in the Tahoe Basin.

That portion of the county west and northwest of Rocklin, lies in the Sacramento Valley, and is, as a rule, under cultivation, and not timbered except with scattering growths, chiefly of oak. East of Rocklin, extending to the line between Ranges 10 and 11 east, the country is locally known as the Auburn and Forest Hill Divides; the former lying between North Fork of the American River and the Bear River, and the latter between the North and Middle Forks of the American River.

The Forest Hill Divide has been well timbered, but most of the timber around the mines has been cut off, and a thick growth of young pines has sprung up. On the slopes next the rivers, the timber grows densely in places. The growths are black, white, and live oak, yellow pine, pitch

*The extremes of climate to be found in Placer County is well illustrated by a story that I heard told while traveling from Auburn to Truckee on the Central Pacific Railroad, by a very popular passenger conductor on that road. He said: "Some years ago I attended a meeting of railroad conductors held in the East, and one day while enjoying ourselves at an old fashioned clam-bake, several of the boys began to tell wonderful stories of the sights to be seen on their respective runs; each tried to outdo his neighbor in piling it on, and some of the lies that those fellows told would have made Eli Perkins blush. Finally it came my turn, and I quietly stated that I was out in California on the Central Pacific, and that I started in the morning from one end of my run (Truckee) where the snow was ten feet deep, and in five hours I was in the midst of oranges, grapes, and beautiful flowers, all growing out of doors and in full bloom. There followed a general silence, no more experiences were related, and do you know those fellows put me down as the boss liar, when I was simply telling the plain, unvarnished truth, as any one who has traveled from Truckee to Sacramento at certain seasons of the year can testify."

pine, and some sugar pine. The Forest Hill Divide is greatly cut up by deep and precipitous cañons, and ranges in elevation from six hundred to three thousand five hundred feet.

The Auburn Divide, from two hundred to three thousand five hundred feet in elevation, is made up of undulating valleys, gently sloping foothills, high hills, and mountains, and covers an area of about two hundred and seventy-five square miles. This is the fruit region of Placer County, and its fame is too well known to need further comment. This region has been pretty well cut over, especially where cultivated and in the vicinity of mines, and everywhere a heavy second growth of pine has sprung up. Towards the Bear and American Rivers, the timber is generally better than elsewhere. The growths are black and white oak, yellow and Digger pine, and some sugar pine. There is no white oak above Township 15 north. In the northeastern part of the divide the timber is of larger growth. East of these two divides, and to the summit of the Sierras, the country is rough and mountainous. The northeastern portion is well timbered. T. 16 N., R. 11 E., on the east side of the railroad, next to the river, is covered with good yellow pine, pitch pine, sugar pine, white fir, black and live oak. On the side west of the railroad the timber has been mostly cut off.

In T. 16 N., R. 12 E., there is heavy yellow pine, pitch pine, sugar pine, spruce, and red fir. T. 16 N., R. 13 E., is well timbered, especially on the southern half of the township, with yellow pine, pitch pine, red fir, and tamarack. There is also some spruce and sugar pine.

T. 16 N., R. 14 E., is covered with the same kind of timber as the last township.

The rest of this region is not so well timbered, the best growth having been cut off, portions of it being very wild and rugged. On the east slope of the Sierras the timber has been of very heavy growth, but considerable of it has been cut. In T. 17 N., R. 15 E., there is a good deal of heavy red fir, white fir, and yellow pine, also black pine and tamarack, except in the southeastern part (Secs. 24 and 25), where it has been well cut over.

T. 17 N., R. 16 E., has been all cut over, little but firewood having been left.

T. 17 N., R. 17 E., is well timbered, where it has not been cut over (about one half of township), with red and white fir, and yellow and black pine. Wherever red fir grows it is the prevailing timber.

T. 16 N., R. 16 E., has been pretty well cut over, except a patch of about six square miles in the eastern part of the township, of good red fir, yellow and black pine. T. 16 N., R. 17 E., is about half cut over, the timber remaining being good red and white fir, yellow pine, and black pine. T. 15 N., R. 16 E., has only been cut over in the southeastern corner, the rest of the township being well timbered with red and white fir and pine. T. 14 N., R. 16 E., is a rough mountainous region, but even here the timber has been cut when at all accessible.

East of the summit of the Sierras, the black pine grows abundantly, seeming to flourish as well on rocky ridges as on lower and more moist ground. Extending from Sierra Valley to Lake Tahoe, and from the State of Nevada to the Summit of the Sierras, lies the so called Truckee Basin, on which there is now standing about three billion feet of saw timber, consisting of yellow, black, and sugar pine, red and white fir. Most of the lumber felled in this basin is sawed at Truckee or in the vicinity, and amounts to between forty and fifty million feet per year, of which fir forms nearly half of the cut, and yellow pine about 35 per cent. The second

growth in this basin is generally the same as the original. Considerable damage is done by forest fires.

SIERRA COUNTY.

Sierra County is bounded on the north by Lassen County, on the east by the State of Nevada, on the south by Nevada County, and on the west by Plumas and Yuba Counties. It covers an area of eight hundred and fifty square miles, the greater portion of which consists of high mountains and table lands, the eastern half of the county being over four thousand feet above sea level, and the western half, which embraces a rugged and broken country, having an elevation of over two thousand feet.

The chief industries are mining and lumbering, the winters being too cold and the area of tillable land too small to farm much. The entire county may be said to be timbered, a portion of Sierra Valley being the most notable exception. With snows thirty or forty feet deep in winter, the firs naturally flourish in this county, and at high elevations form the greater part of the forests. The principal forest growths are red fir, white fir, yellow and black pine, spruce, cedar, and sugar pine. The black pine grows chiefly on the east slope of the Sierra, especially around the south end of Sierra Valley. The wild plum grows profusely throughout the county, and the fruit is largely gathered and made into preserves.

There are eight sawmills in Sierra County, and they cut about fourteen million feet of lumber each year. A great many logs are taken out of this county and sawed at Truckee. About one million five hundred thousand feet of shingles and shakes are made each year.

Much of the timber in this county is situated in such inaccessible localities that it would not pay to cut it, so it will probably be allowed to continue its service as a protector to the vast watersheds of the North and Middle Yubas.

NEVADA COUNTY.

Nevada County is bounded on the north by Yuba and Sierra Counties, on the east by the State of Nevada and Placer County, on the south by Placer County, and on the west by Yuba County, and covers an area of one thousand and sixteen square miles, or six hundred and fifty thousand two hundred and forty acres.

The Sierras extend across the eastern portion of the county, and a little more than half of its entire area consists of mountainous land. The west slope of the Sierras descends more or less gradually from an altitude of eight thousand feet on their summit to the foothills, which cover the southwestern part of the county, and is well drained by the Middle and South Forks of the Yuba and the Bear River. The foothill region in the western part of the county covers an area of about four hundred square miles, and except on its eastern border, where the low spurs of the Sierras extending westward causes it to be very broken, is very fertile, and is fast becoming celebrated for its fine fruit.

Nevada is essentially a timbered county, and even at the present time presents little but a wooded landscape to the eye. The western portion of the county was originally covered with a thick growth of Digger pine, white oak, black oak, and yellow pine, but most of it has been cut, either for use in the mines or by settlers clearing land for agricultural purposes. Around Grass Valley and Nevada City, within a radius of five miles from each place, all of the original timber has been cut off, and is now replaced by a dense growth of young pine (second-growth pine). In

fact, over the entire country west of the Sierras, wherever pine timber has been cut off, a dense growth of "second-growth pine" has sprung up in its place.

The scattered growths in the extreme western portion of the county can be separated from the more heavily timbered region by an imaginary line starting at the southeast corner of T. 14 N., R. 8 E., and running directly north for twelve miles; thence northeast to where Rush Creek empties into the South Yuba River; and thence northeast to the junction of the North Yuba and the Middle Yuba Rivers.

All of the county west of this line is covered with a scattered growth of Digger pine, white oak, yellow pine, and black oak. Manzanita and underbrush grows nearly everywhere. Very few yellow pine or black oak trees are seen in the western half of the foothill region, but they become more numerous as the dividing timber line is approached.

East of the dividing timber line and extending to the summit of the Sierras, the entire country is covered with a timber growth of greater or less size and density, the principal species being yellow pine, red fir, black oak, sugar pine, spruce, live oak, tamarack, white fir, and hemlock.

East of the summit of the range, the timber has been pretty well cut over, but where it is still untouched, it consists of heavy red and white fir, pine, and tamarack. Truckee has long been a lumbering center, and naturally the timber nearest to hand was cut first.

There are fifteen sawmills in Nevada County, with an estimated cut of fifty million feet, board measure, per year of yellow and sugar pine, fir, cedar, and spruce. There has been about as much timber used in the mines of this county as has been sawed by mills. When using steam power, the mines burnt pine fuel entirely, but now water power is used.

The residents of the western part of the county use oak wood for fuel, and but little pine. Forest fires have been quite destructive, two years ago burning from Bloomfield northeast over a large area in Tps. 18 N., Rs. 10 and 11 E. It was supposed to have started from sheepherders' camp fires, as this is a district into which sheep are driven in summer.

AMADOR COUNTY.

Amador County lies between the South Fork of the Cosumnes River and the Mokelumne River, and extends from Alpine County on the east to the Sacramento Valley on the west. It covers an area of five hundred and sixty square miles, of which about four hundred and fifty square miles belong to the lower foothill region, composed of rolling hills and numberless flats, and generally timbered with a scattering growth of oaks and Digger pines. The eastern part of the county is very narrow, and from Volcano to the eastern boundary is generally covered with timber, yellow pine, Sugar pine, black pine in the extreme eastern part, and firs being the principal growths. In the vicinity of Ham's Station, the sugar pine belt of the eastern part of El Dorado County extends through Amador County, the trees being of large growth, some reaching a height of three hundred feet, and a diameter of twelve or thirteen feet. Volcano was a prosperous mining camp in early days, and considerable mining was done in the vicinity, and around these mines the timber was pretty well cut off, and is now replaced by a vigorous second growth. Not a great deal of lumber is being cut in this county, but the shake-makers in the eastern part of it seem to carry on a profitable business.

EL DORADO COUNTY.

El Dorado is bounded on the north by Placer County, on the east by the State of Nevada and Alpine County, on the south by Amador County, and on the west by Sacramento County. It covers an area of one thousand eight hundred and fifty square miles, of which about one thousand and fifty square miles are in the Sierras, the remainder being lower foothill and valley land. This county is watered by the Cosumnes and American Rivers and their tributaries. On the western border of the county is a strip of treeless level land or valley, from which the country slopes gradually upwards towards the east, first undulating, then hilly; and finally, at a distance of nearly thirty miles, it becomes broken and rugged, and joins on to the Sierras. This section is covered by a scattered growth of white and black oak, with Digger pine near its western boundaries, and more or less extended patches of buckeye, manzanita, and chaparral.

Fruit and vines have already been extensively put out in this region, and have met with such remarkable success that no doubt all of the available area will be devoted to their culture. The rest of the county, from the eastern boundary to within about fifteen miles of Placerville, is in the Sierras, and generally well timbered. On the east slope of the Sierras yellow and black pine and fir are the chief growths, while on the western slope, which is more heavily timbered, yellow and sugar pine prevail, with a good growth of fir and cedar. In the northern and eastern parts of the county there are several fine belts of sugar pine, noticeably around Pi Pi Valley and Georgetown. The timber that has been cut was entirely for local uses, but no doubt cheaper transportation for lumber will soon be procured, and the valuable pine forests will be utilized for lumber. This county possesses a fine irrigation system, hundreds of miles of canals carrying water over its surface. The principal supply of water is obtained from a series of small lakes lying in the high Sierras, which drain a large forest-covered watershed above an elevation of six thousand feet, and are fed throughout the year by melted snow.



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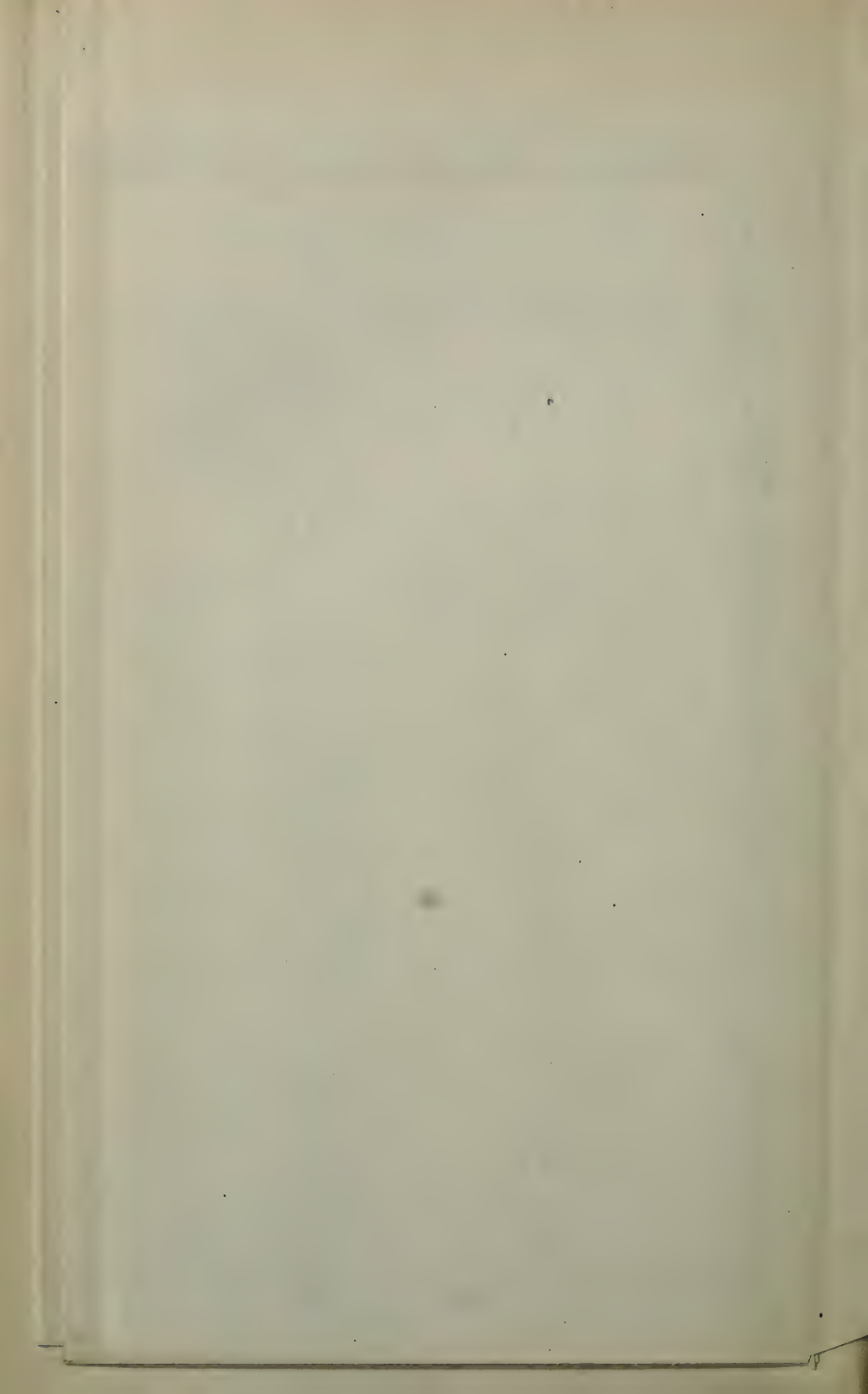
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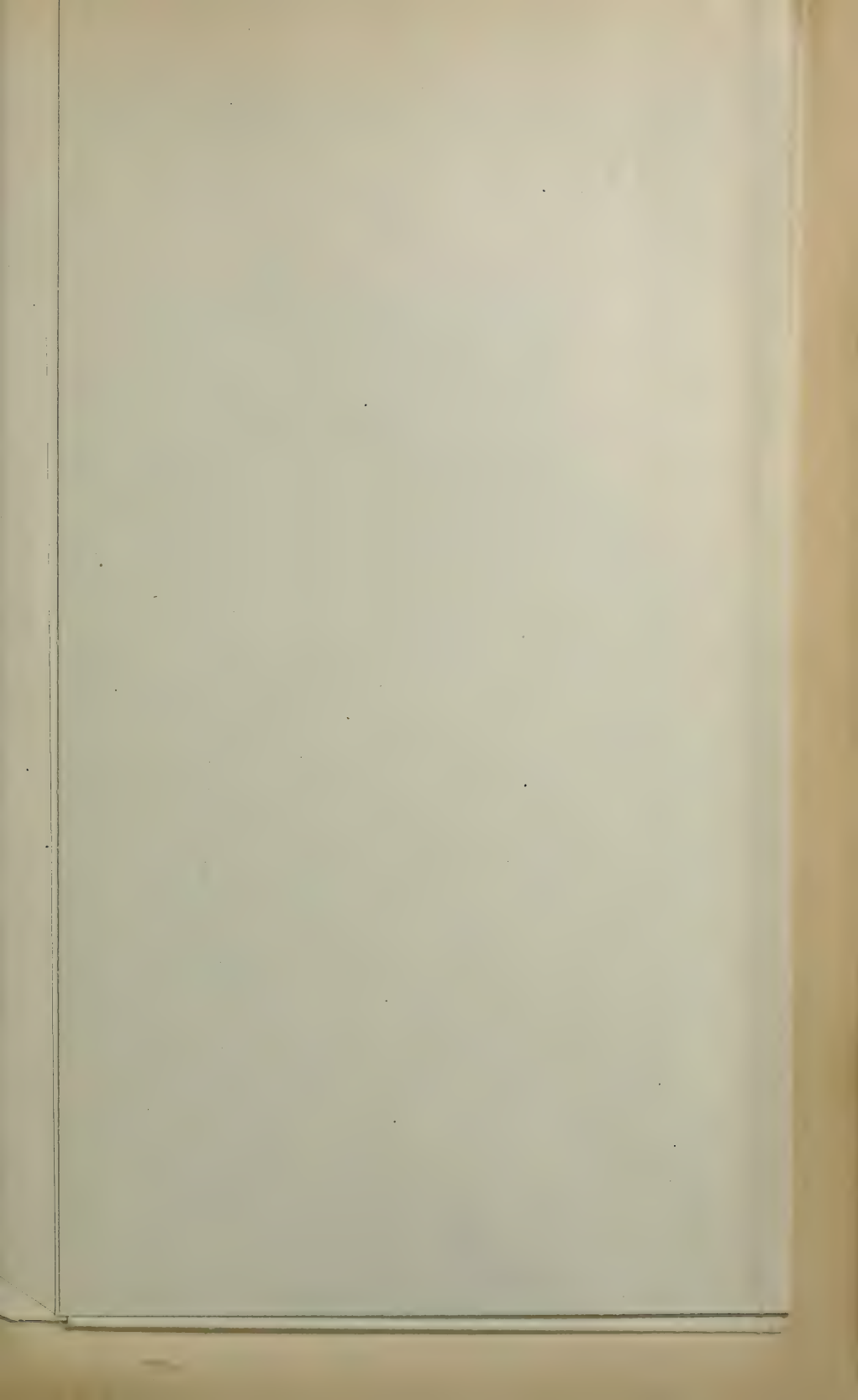
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OFFICES STATE BOARD OF HORTICULTURE.



1

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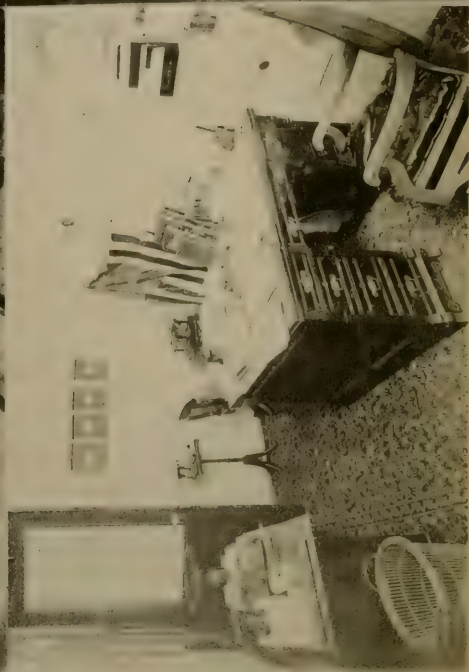


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THIRD BIENNIAL REPORT
OF THE
STATE BOARD OF HORTICULTURE
OF THE
STATE OF CALIFORNIA,
FOR THE
THIRTY-EIGHTH AND THIRTY-NINTH FISCAL YEARS.

EDITED BY THE SECRETARY.



SACRAMENTO:
STATE OFFICE, : : : J. D. YOUNG, SUPT. STATE PRINTING.
1888.

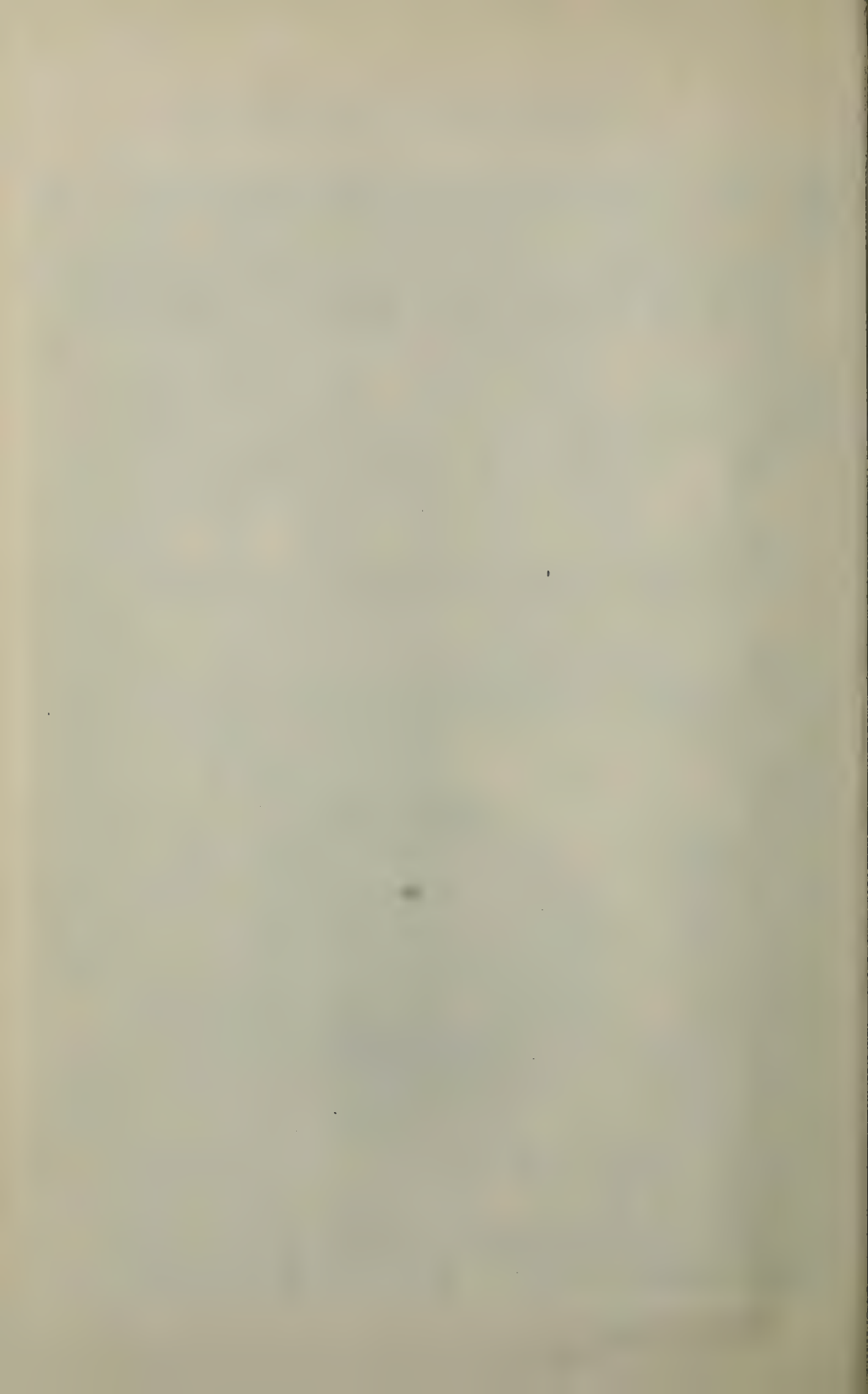


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OFFICERS AND MEMBERS OF THE BOARD.

HON. ELLWOOD COOPER, President	Santa Barbara,
Commissioner for the Los Angeles District.	
REV. N. R. PECK, Vice-President	Penryn,
Commissioner for the El Dorado District.	
GEN. M. G. VALLEJO, Treasurer	Sonoma,
Commissioner for the Sonoma District.	
DR. EDWIN KIMBALL, Auditor	Haywards,
Commissioner for the State at large.	
FRANK A. KIMBALL*	National City,
Commissioner for the State at large.	
SOL. RUNYON	Courtland,
Commissioner for the Sacramento District.	
W. M. BOGGS	Napa City,
Commissioner for the Napa District.	
W. C. WEST	Fresno,
Commissioner for the San Joaquin District.	
A. BLOCK	Santa Clara,
Commissioner for the San Francisco District.	

B. M. LELONG, Secretary.

Office of the Board :

No. 220 SUTTER STREET, SAN FRANCISCO.

W. G. KLEE	Inspector of Fruit Pests.
------------------	---------------------------

* Commissioned August 23, 1888, to succeed Mr. A. Scott Chapman, resigned August 11, 1888.

To his Excellency R. W. WATERMAN, Governor, and to the honorable the Senate and Assembly of the State of California:

In accordance with the Act of the Legislature, approved March 13, 1883, we, the State Board of Horticulture of the State of California, respectfully submit to your kind consideration this our biennial report for the thirty-eighth and thirty-ninth fiscal years, ending June 30, 1888.

ELLWOOD COOPER, President.

Attest: B. M. LELONG, Secretary.

SAN FRANCISCO, July 2, 1888.

STATE BOARD OF HORTICULTURE.

AN ACT

To create and establish a State Board of Horticulture, and appropriate money for the expenses thereof.

[Approved March 13, 1883.]

The People of the State of California, represented in Senate and Assembly, do enact as follows :

SECTION 1. There shall be a State Board of Horticulture, consisting of nine members, who shall be appointed by the Governor; two from the State at large, and one from each of the seven horticultural districts, which are hereby constituted as follows:

First—The Sonoma District, which shall include the Counties of Sonoma, Marin, Lake, Mendocino, Humboldt, Del Norte, Trinity, and Siskiyou.

Second—The Napa District, which shall include the Counties of Napa, Solano, and Contra Costa.

Third—The San Francisco District, which shall include the City and County of San Francisco, and the Counties of San Mateo, Alameda, Santa Clara, Santa Cruz, San Benito, and Monterey.

Fourth—The Los Angeles District, which shall include the Counties of Los Angeles, Ventura, Santa Barbara, San Luis Obispo, San Bernardino, and San Diego.

Fifth—The Sacramento District, which shall include the Counties of Sacramento, Yolo, Sutter, Colusa, Butte, Tehama, and Shasta.

Sixth—The San Joaquin District, which shall include the Counties of San Joaquin, Stanislaus, Merced, Fresno, Tulare, and Kern.

Seventh—The El Dorado District, which shall include the Counties of El Dorado, Amador, Calaveras, Tuolumne, Mariposa, Placer, Nevada, Yuba, Sierra, Plumas, Lassen, Modoc, Alpine, Mono, and Inyo.

SEC. 2. The members appointed from each district shall be residents of the district from which they are appointed, and shall be specially qualified by practical experience and study in connection with the industries dependent upon horticulture. They shall each hold office for the term of four years, except that of the nine first appointed, four, to be determined by lot, shall retire at the end of two years, when their successors shall be appointed by the Governor.

SEC. 3. The Board shall appoint and prescribe the duties of a Secretary, who shall not be one of their number, and elect of their own number a Treasurer, both to hold office during the pleasure of the said Board. The Treasurer shall give a bond to the State, with sureties approved by the said Board, in the sum of ten thousand dollars, for the faithful discharge of his duties.

SEC. 4. The Board may receive, manage, use, and hold donations and bequests for promoting the objects of its formation. It shall meet semi-annually, and as much oftener, and at such places, as it may deem expedient, to consult and adopt such measures as may best promote the horticultural industries of the State. It may, but without expense to the State, select and appoint competent and qualified persons to lecture in each of the horticultural districts named in section one of this Act, for the purpose of illustrating practical horticultural topics, and imparting instruction in the methods of culture, pruning, fertilizing, and also in the best methods of treating the diseases of fruit and fruit trees, cleansing orchards, and exterminating insect pests. The office of the Board shall be kept open to the public, subject to the rules of the Board, every day, excepting legal holidays, and shall be in charge of the Secretary during the absence of the Board.

SEC. 5. For the purpose of preventing the spread of contagious disease among fruit and fruit trees, and for the prevention, treatment, cure, and extirpation of fruit pests and the diseases of fruit and fruit trees, and for the disinfection of grafts, scions, orchard debris, empty fruit boxes and packages, and other suspected material or transportable articles, dangerous to orchards, fruit, and fruit trees, said Board shall make regulations for the inspection and disinfection thereof, which said regulations shall be circulated in printed form by the Board among the fruit growers and fruit dealers of the State, shall be published at least twenty days in two daily newspapers of general circulation in the State not of the same city or county, and shall be posted in three conspicuous places in each county in the State, one of which shall be at the County Court House thereof. Such regulations when so posted shall be held to impart notice of their contents to all persons within this State, and shall be binding upon all persons.

SEC. 6. The said Board shall elect of their own number, or appoint from without their number, a competent person especially qualified by practical experience in horticulture for the duties of his office, who shall be known as Inspector of Fruit Pests (to hold office at the pleasure of the Board), whose duty it shall be to visit the horticultural districts of

the State, to see that all regulations of said Board and provisions of law to prevent the spread of fruit pests and diseases of trees and plants injurious to the horticultural interests of the State, and all regulations of said Board in the nature of quarantining infected or infested districts, and also all rules and regulations of said Board concerning disinfection of fruits, trees, plants, grafts, scions, orchard debris, empty fruit boxes and packages, and other material dangerous to orchards, fruit, and fruit trees, are enforced. He shall, also, whenever required, and under the direction of the Board, and may also upon his own motion, and upon the complaint of interested parties, inspect orchards, nurseries, and other places suspected, or believed to be infested with fruit pests, or infected with contagious disease injurious to trees, plants, or fruits, and he shall report the facts to said Board. If, upon report of said Inspector, or from well attested facts otherwise before it, said Board shall be of the opinion that any locality, orchard, district, or place is infested with fruit pests, or infected with contagious disease injurious to trees, plants, or fruits, and liable to spread to other localities to the injury of other persons or places, said Board shall by an order entered upon its minutes, so declare, said and such infested or infected district or place shall be under the quarantine regulations of said Board. As soon, however, as in the opinion of said Inspector the danger from such locality has ceased, he may suspend said quarantine regulations, and shall immediately report the fact to the Board, who may approve or disapprove his action. He shall from time to time, and whenever required by said Board, report to it such information as he may acquire from observation, experience, and otherwise, as to the best modes of diminishing and eradicating fruit pests and diseases from orchards; and also suggestions in practical horticulture; the adaptation of products to soil, climate, and markets, and such other facts and information as shall be calculated to improve the horticultural interests of the State.

SEC. 7. The said Board, and, in case of necessity, during the recess of the Board, the said Inspector may appoint such quarantine guardians as may be needed to carry out the provisions of this Act, whose duties it shall be to see that the regulations of the Board and the instructions of the Inspector are enforced and carried out; they shall also report to said Inspector, or to the State Board, all infractions or violations of said directions, regulations, and of the law in regard to quarantine disinfection and destruction of pests, and precautions against the spreading pests and diseases. The salary of quarantine guardians shall not exceed two dollars per day, and shall be paid by the owners of orchards and other places and localities under quarantine regulations; and they may maintain an action therefor before any Justice of the Peace in any township in which any quarantined locality is wholly or in part situated. But in no case shall they have any claim upon the State for such services.

SEC. 8. It shall be the duty of the Secretary to attend all meetings of the Board, and to preserve records of its proceedings and correspondence; to collect books, pamphlets, periodicals, and other documents containing valuable information relating to horticulture, and to preserve the same; to collect statistics and other information showing the actual condition and progress of horticulture in this State and elsewhere; to correspond with agriculture and horticulture societies, colleges, and schools of agriculture and horticulture, and other persons and bodies, as he may be directed by the Board, and prepare, as required by the Board, reports for publication; he shall also act as assistant to and obey the directions of the Inspector of Fruit Pests in the exercise of the duties of his office, and shall be paid for his services as such Secretary and assistant a salary of not to exceed seventy-five dollars per month.

SEC. 9. The Inspector of Fruit Pests shall receive as compensation for his services not to exceed the sum of one hundred and fifty dollars per month, and his actual traveling expenses shall be allowed, not to exceed seven hundred and fifty dollars per annum; the other members of the said Board shall receive no compensation whatever.

SEC. 10. The Board shall biennially, in the month of January, report to the Legislature a statement of its doings, with a copy of the Treasurer's accounts for the two years preceding the session thereof, and abstracts of the reports of the Inspector of Fruit Pests and Secretary. Said report shall not exceed one hundred printed pages.

SEC. 11. The Treasurer shall receive all moneys belonging to the Board, and pay out the same only for bills approved by it, and shall annually render a detailed account to the Board.

SEC. 12. There is hereby appropriated for the uses of the State Board of Horticulture, as set forth in this Act, out of any moneys in the State Treasury not otherwise appropriated, the sum of five thousand dollars for the year commencing April first, one thousand eight hundred and eighty-three, and five thousand dollars for the year commencing April first, one thousand eight hundred and eighty-four, and the State Controller will draw his warrants upon the State Treasurer in favor of the Treasurer of said Board for the said sums, or any part thereof, when they become available, upon proper demand being made for the same by the said Board.

SEC. 13. This Act shall take effect and be in force from and after its passage, and all Acts or parts of Acts inconsistent or in conflict with the provisions of this Act are hereby repealed.

CHAPTER VII.

An Act to amend sections eight, nine, ten, eleven, and twelve of an Act entitled "An Act to create and establish a State Board of Horticulture, and appropriate money for the expenses thereof," approved March thirteenth, eighteen hundred and eighty-three.

[Approved February 18, 1885.]

The People of the State of California, represented in Senate and Assembly, do enact as follows:

SECTION 1. Section eight of said Act is hereby amended to read as follows:

Section 8. It shall be the duty of the Secretary to attend all meetings of the Board, and to preserve records of its proceedings and correspondence; to collect books, pamphlets, and periodicals, and other documents containing valuable information relating to horticulture, and to preserve the same; to collect statistics and other information showing the actual condition and progress of horticulture in this State and elsewhere; to correspond with agricultural and horticultural societies, colleges, and schools of agriculture and horticulture, and other persons and bodies, as he may be directed by the Board, and prepare, as required by the Board, reports for publication. He shall also act as assistant to and obey the directions of the Inspector of Fruit Pests in the exercise of the duties of his office, and shall be paid for his services as such Secretary and assistant a salary of one hundred and fifty dollars per month, to be paid as other State officers.

Sec. 2. Section nine of said Act is hereby amended to read as follows:

Section 9. The Inspector of Fruit Pests shall receive as compensation for his services the sum of two hundred dollars per month, to be paid as other State officers, and his actual traveling expenses shall be allowed, not to exceed one thousand dollars per annum. The members of the Board and Secretary shall receive their actual traveling expenses in attending semi-annual meetings of the Board.

Sec. 3. Section ten of said Act is hereby amended to read as follows:

Section 10. The Board shall, biennially, in the month of January, report to the Legislature a statement of its doings, with a copy of the Treasurer's accounts for the two years preceding the session thereof, and abstracts of the reports of the Inspector of Fruit Pests and Secretary.

Sec. 4. Section eleven is hereby amended to read as follows:

Section 11. The Treasurer shall receive all moneys belonging to the Board, and pay out the same only for bills approved by the Chairman of the Finance Committee, and shall annually render a detailed account to the Board.

Sec. 5. Section 12. There is hereby appropriated, for the uses of the State Board of Horticulture, as set forth in this Act, out of any moneys in the State Treasury not otherwise appropriated, the sum of ten thousand dollars for the year commencing April first, one thousand eight hundred and eighty-five, and ten thousand dollars for the year commencing April first, one thousand eight hundred and eighty-six, and the State Controller will draw his warrants upon the State Treasurer in favor of the Treasurer of said Board for the said sums, or any part thereof, when they become available, upon proper demand being made for the same by the said Board.

Sec. 6. This Act shall take effect immediately.

CHAPTER XXXVI.

An Act to prevent the spreading of fruit and fruit tree pests and diseases, and to provide for their extirpation.

[Approved March 10, 1885.]

The People of the State of California, represented in Senate and Assembly, do enact as follows:

SECTION 1. It shall be the duty of every owner, possessor, or occupier of an orchard, nursery, or land where fruit trees are grown within this State, to disinfect all fruit trees grown on such lands infested with any insect or insects, or the germs thereof, or infested by any contagious disease known to be injurious to fruit or fruit trees, before the removal of the same from such premises for sale, gift, distribution, or transportation. Fruit boxes which have been used for shipping fruit to any destination are hereby required to be disinfected previous to their being again used for any purpose; all boxes returned to any orchard, storeroom, salesroom, or any place used or to be used for storage, shipping, or any other purpose, must be disinfected within three days after their return; and any and all persons failing to comply with the requirements of this section shall be guilty of a misdemeanor. All packages, known as free packages, must be destroyed or disinfected before being again used.

Sec. 2. It shall be the duty of the owner, lessee, or occupier of any orchard within this State, to gather all fruit infested by the insects known as the codlin moth, peach moth, red spider, plum weevil, and kindred noxious insects, their larvæ or pupæ, which has fallen from the tree or trees, as often as once a week, and dispose of or destroy the same in such manner as to effectually destroy all such insects, their larvæ or pupæ. It shall be the duty of the Inspector of Fruit Pests, or the Quarantine Guardian, to inspect

fruit packages, and all trees and plants, cuttings, grafts, and scions, known or believed to be infested by any insect or insects, or the germs thereof, or their eggs, larvæ, or pupæ, injurious to fruit or fruit trees, or infested with any disease liable to spread contagion, imported or brought into this State from any foreign country, or from any of the United States or Territories, and if, upon inspection, such fruit, or fruit packages, are found to be infested or infected, it shall be a misdemeanor to offer the same for sale, gift, distribution, or transportation, unless they shall be first disinfected.

SEC. 3. Every person shipping fruit trees, scions, cuttings, or plants, from any orchard, nursery, or other place where they were grown or produced, shall place upon or securely attach to each box, package, or parcel containing such fruit trees, scions, cuttings, or plants, a distinct mark or label, showing the name of the owner or shipper, and the locality where produced. And any person who shall cause to be shipped, transported, or removed from any locality declared by the State Board of Horticulture to be infested with fruit tree or orchard pests, or infected with contagious diseases injurious to trees, plants, or fruits, unless the same shall have been previously disinfected, shall be guilty of a misdemeanor. Disinfection shall be to the satisfaction of the State Board of Horticulture, or the Inspector of Fruit Pests. When disinfected, the fact shall be stamped upon each box, package, or separate parcel of fruit trees, scions, cuttings, or plants; and any person who shall cause to be shipped, transported, or removed, any such box, parcel, or package, from any quarantine district or locality, not bearing such stamp, shall be guilty of a misdemeanor, and may be punished by a fine, as provided in section six of this Act. Any person who shall falsely cause such stamp to be used, or shall imitate or counterfeit any stamp or device used for such purpose, shall be guilty of a misdemeanor.

SEC. 4. It shall be the special duty of each member of the State Board of Horticulture to see that the provisions of this Act are carried out within his respective horticultural district, and all offenders duly punished.

SEC. 5. All fruit trees infested by any insect or insects, their germs, larvæ, or pupæ, or infected by disease known to be injurious to fruit, or fruit trees, and liable to spread contagion, must be cleaned or disinfected before the first day of April, eighteen hundred and eighty-five, and on or before the first day of April of every succeeding year thereafter. All owners or occupants of lands on which fruit trees are grown failing to comply with the provisions of this section, shall be guilty of a misdemeanor, and fined as provided for in section six of this Act. All fruit, packages, trees, plants, cuttings, grafts, and scions, that shall not be disinfected within twenty-four hours after notice by the Inspector of Fruit Pests, or a duly appointed Quarantine Guardian, or any member of the Board of Horticulture, shall be liable to be proceeded against as a public nuisance.

SEC. 6. Any person or corporation violating any of the provisions of this Act shall be deemed guilty of a misdemeanor, and shall, on conviction thereof, be punishable by a fine of not less than twenty-five dollars nor more than one hundred dollars for every offense.

AN ORDINANCE

For the Destruction of Insects Injurious to Fruit and Fruit Trees.

RECOMMENDED FOR ADOPTION.

The Board of Supervisors of the County of — do ordain as follows:

SECTION 1. Whenever a petition is presented to the Board of Supervisors of — County, signed by five or more persons, who are resident freeholders and possessors of an orchard, stating that certain or all orchards or trees of any variety are infected with scale bug, codlin moth, or other insects that are destructive of trees, and asking the appointment of a commission to supervise the destruction of such insects, the Board of Supervisors shall, within twenty days after such petition is presented to the Board, appoint three Commissioners for the said county, to be known as the County Board of Horticultural Commissioners.

SEC. 2. The Commissioners shall hold their office for the term of three years, and until their successors are qualified; except that of the Commissioners first appointed one shall hold for one year, one for two years, and the third for three years. The Commissioners first appointed shall decide by lot which of them shall hold for one year, which for two years, and which for three years. After the first Commissioners are appointed, the Board of Supervisors shall appoint one Commissioner every year, such appointment to be made one month or thereabouts before the commencement of the term of the appointed.

SEC. 3. Any vacancy which may from any cause occur in the Commission shall be filled by appointment of the Board of Supervisors. The appointee to fill a vacancy shall hold for the balance of the unexpired term.

SEC. 4. Whenever the County Board of Horticultural Commissioners shall be informed by complaint in writing of any person residing in said county that an orchard, nursery, or trees, or any place in their jurisdiction, is infested with scale bug, codlin moth, red spider, or other noxious insects, liable to spread contagion dangerous to the trees or fruit of the complainant, or their eggs or larvæ injurious to fruit or fruit trees, they shall cause inspection to be made of the said premises, and if found infested they shall notify the owner or owners, or the persons or person in charge or possession of the said trees or place, that the same are infected with the said insects, or any of them, or their eggs or

larvæ, and shall require such person or persons to disinfect the same within such reasonable time as they may direct, to be specified in the notice; such notice may be served by any Commissioner or any person deputed by the Commissioners for that purpose, and shall be served by delivering a copy thereof to such owner or persons having charge thereof, personally; *provided*, that when any person other than the owner is in possession or charge of such place the notice shall be served upon the owner, if within the county, as well as the person so in charge or possession of such premises.

SEC. 5. If within the time specified in said notice such disinfection has not been accomplished, then such person or persons shall be required by notice, to be served as hereinbefore provided, to make application of such treatment, applied in such manner and within such time as the Commissioners may prescribe, but subject to the general laws of the State of California.

SEC. 6. If the person so notified shall fail to disinfect such places or to apply such treatment in the manner and within the time prescribed in the notice, such orchards or nurseries or places shall be deemed a public nuisance, and may be proceeded against in any Court of competent jurisdiction, and abated as such nuisance either by the disinfection of such place under the direction of said commission or other public authority, or by the destruction thereof, when necessary to prevent the spread of such disease or pest.

SEC. 7. The cost and expense of such proceedings for the compulsory disinfection of such premises, including the expenses of disinfection when ordered, shall be in lieu upon said premises.

SEC. 8. Said Board of Commissioners shall have the power to divide the county into districts and appoint a local Inspector for each district, who shall perform such duties as may be required of him by the Board of Commissioners.

SEC. 9. Said County Board of Horticultural Commissioners shall perform such other duties as may be prescribed by law, and for a failure to perform such duties or any of their duties they may be removed by the Board of Supervisors upon complaint in writing.

SEC. 10. Each Commissioner shall receive — dollars per day, and each local Inspector — dollars per day, for his services for each day in which such Commissioner or Inspector is actually engaged in the performance of his duties; *provided*, that the total amount of expenditure for services of Commissioners and Inspectors shall not exceed in any one year the sum of — dollars, without a special order of this Board to that effect.

SEC. 11. This ordinance shall take effect and be in force from and after the — day of —, A. D. eighteen hundred and eighty —; and prior to said day shall be published, with the names of the members voting for and against the same, for at least one week in the —, a newspaper published in said county.

Dated —, 188—.

_____,
Chairman of the Board.

Attest:

Clerk.

REPORT OF THE TREASURER.

[SUBMITTED AND ADOPTED BY THE BOARD AT THE MEETING OF
JULY 2, 1888.]

*To the honorable the Officers and Members of the State Board of Horticulture
of the State of California:*

GENTLEMEN: I herewith submit to your kind consideration and approval
this, my biennial report as your Treasurer.

The following amounts have been paid by me within the past year, to
cover claims, as follows:

<i>July.</i>		
Political Record, subscription one year.....	\$2 50	
Dutton & Partridge, two boxes of pens.....	2 00	
Patron Publishing Company, printing, etc.....	7 00	
A. Carlisle & Co., supplies.....	75	
F. Chester, rent of office.....	40 00	
B. M. Lelong, office expenses.....	7 00	
A. Roman, books.....	26 00	
		\$85 25
<i>August.</i>		
H. S. Crocker & Co., printing and supplies.....	\$58 75	
A. Roman, books, etc.....	32 00	
James Duffy & Co., carpets, etc.....	215 10	
Swan & Stein, painting.....	16 25	
Dutton & Partridge, supplies.....	21 08	
Osborn & Alexander, hat hooks.....	3 75	
B. M. Lelong, office expenses.....	27 70	
W. G. Klee, traveling expenses.....	22 60	
A. Hayward, rent of office.....	85 00	
Samuel Carson & Co., books.....	14 50	
A. Carlisle & Co., stationery.....	4 10	
Geo. E. Colby, two analyses.....	10 00	
San Francisco Examiner, one year.....	7 80	
San Francisco Chronicle, one year.....	7 80	
Delta Publishing Company, Delta, one year.....	2 00	
Pacific Fruit Grower, one year.....	1 50	
Southern California Planter, one year.....	1 50	
Rural Californian, one year.....	1 50	
Sacramento Bee, one year.....	6 00	
Los Angeles Herald, one year.....	8 00	
Pacific Rural Press, one year.....	3 00	
Times-Mirror Company, printing programmes.....	12 00	
E. A. Schnieder, two analyses.....	20 00	
Dutton & Partridge, stationery.....	65 95	
W. G. Klee, traveling expenses.....	44 55	
B. M. Lelong, office expenses.....	95 15	
		\$787 58
<i>September.</i>		
Dutton & Partridge, stationery.....	\$29 30	
Arthur M. Ebbetts, coal.....	4 50	
Sacramento Record-Union, one year.....	6 00	
Union Box Factory, 100 boxes.....	37 00	
Marysville Appeal, one year.....	6 00	
W. G. Klee, traveling expenses.....	94 05	
B. M. Lelong, office expenses.....	154 70	
A. Hayward, rent of office.....	85 00	
San Francisco Call, one year.....	7 80	
N. P. Cole & Co., one desk.....	82 40	
Samuel Carson & Co., one book.....	3 00	
Geo. E. Colby, four arsenic tests.....	20 00	
Thomas Parsons, Janitor.....	7 50	
		\$537 25

October.

Swan & Stein, painting sign	\$4 50
Thomas Parsons, Janitor	7 50
Clara A. Brockman, clerical work	30 00
A. Hayward, rent of office	85 00
Dutton & Partridge, supplies	12 25
W. G. Klee, traveling expenses	19 25
B. M. Lelong, office expenses	405 97

\$564 47

November.

Dutton & Partridge, stationery	\$31 45
Samuel Carson & Co., books	27 50
N. P. Cole & Co., umbrella stand	3 75
H. S. Crocker & Co., supplies	19 00
Swan & Stein, painting	4 50
A. Hayward, rent of office	85 00
W. G. Klee, traveling expenses	104 25
Thomas Parsons, Janitor	7 50
Clara A. Brockman, clerical work	30 00
A. K. Whitton, reporting Eighth Convention	225 00
N. R. Peck, traveling expenses	37 05
M. G. Vallejo, traveling expenses	31 35
A. Scott Chapman, traveling expenses	65 90
A. Block, traveling expenses	25 85
Ellwood Cooper, traveling expenses	62 50
W. M. Boggs, traveling expenses	26 35
B. M. Lelong, office expenses	138 20
Dr. Edwin Kimball, traveling expenses	21 65

\$946 80

December.

H. S. Crocker & Co., stationery	\$9 50
Geo. E. Colby, arsenic test	5 00
Dutton & Partridge, supplies	12 65
W. G. Klee, traveling expenses	34 00
B. M. Lelong, office expenses	75 80
Samuel Carson & Co., books	10 50
L. A. Berteling & Co., one barometer	16 00
James Duffy & Co., one pole and curtain	6 50
N. P. Cole & Co., one chair	6 50
Clara A. Brockman, clerical work	40 00
Thomas Parsons, Janitor	7 50
A. Hayward, rent of office	85 00

\$309 20

January.

Alta California, one year	\$5 40
H. S. Crocker & Co., supplies	16 75
Dutton & Partridge, stationery	15 78
Swan & Stein, painting	2 00
James Duffy & Co., repairing carpets, etc.	7 50
Arthur M. Ebbetts, coal	7 15
Samuel Carson & Co., books	3 00
Clara A. Brockman, clerical work	40 00
Thomas Parsons, Janitor	7 50
A. Hayward, rent	85 00
B. M. Lelong, office expenses	34 35
W. G. Klee, traveling expenses	50 10
N. P. Cole & Co., one rocker and one table	6 00

\$280 53

February.

Samuel Carson & Co., books	\$6 50
Dutton & Partridge, supplies	10 82
Thomas Parsons, Janitor	7 50
Swan & Stein, painting	12 00
Osborn & Alexander, one stepladder	3 20
Clara A. Brockman, clerical work	40 00
A. Hayward, rent of office	85 00
N. P. Cole & Co., one table	8 00
W. G. Klee, traveling expenses	58 35
B. M. Lelong, office expenses	75 70

\$307 07

March.

Dutton & Partridge, supplies	\$0 75	
Thos. Parsons, Janitor	7 50	
Arthur M. Ebbetts, coal	4 00	
A. Hayward, rent of office	85 00	
B. M. Lelong, office expenses	69 45	
		\$166 70

April.

H. S. Crocker & Co., supplies	\$15 00	
Dutton & Partridge, stationery	14 85	
N. P. Cole & Co., furniture (one desk, one cabinet, one table)	102 50	
Samuel Carson & Co., books	4 80	
James Duffy & Co., papering	6 08	
Giles Lithograph and Liberty Printing Co., lithographic plates	153 90	
A. K. Whitton, reporting Ninth Convention	200 00	
Minnie V. Cox, sketching	60 00	
Los Angeles Tribune, one year	7 00	
Patten & Holstein, wood cuts	51 00	
Geo. Harold Ward, clerical work	25 00	
Thos. Parsons, Janitor	7 50	
A. Hayward, rent of office	85 00	
A. S. Chapman, traveling expenses	33 50	
Sol. Runyon, traveling expenses	76 00	
N. R. Peck, traveling expenses	57 85	
W. G. Klee, traveling expenses	86 75	
B. M. Lelong, office expenses	114 21	
		\$1,100 94

May.

Thos. Parsons, Janitor	\$7 50	
Geo. Harold Ward, clerical work	25 00	
A. Hayward, rent of office	85 00	
James Duffy & Co., papering	17 75	
Dutton & Partridge, supplies	48 80	
Ellwood Cooper, traveling and incidental expenses	24 85	
W. G. Klee, traveling expenses	17 80	
B. M. Lelong, office expenses	65 88	
		\$292 58

June.

The J. Dewing Company, one book	\$8 00	
L. Ph. Bolander, fumigating apparatus	57 00	
James Duffy, carpet, etc.	15 60	
Neville & Co., cover for trees, etc.	42 25	
Swan & Stein, painting large street sign	16 00	
Thomas Parsons, Janitor	7 50	
George Harold Ward, clerical work	25 00	
A. Hayward, rent of office	85 00	
Dutton & Partridge, supplies	29 13	
N. P. Cole & Co., one pedestal and one table	45 00	
W. G. Klee, traveling expenses	21 35	
B. M. Lelong, office expenses	69 80	
		\$421 63
Salary of Inspector, twelve months		2,400 00
Salary of Secretary, twelve months		1,800 00
Total		\$10,000 00
State appropriation		\$10,000 00

SUPPLEMENTARY REPORT.

The amounts below are the total expenditures for the thirty-eighth and thirty-ninth fiscal years. In furnishing you with the following table of expenses, I desire to say that I do so to show you the rapid increase of the business of this department. This also indicates the rapidity in which the industry has increased in this State within the past year.

I desire also to mention that in the months of April, May, and June, 1887, there were no funds or appropriation for this Board to draw upon for any expense whatever, and the office should have been closed during this time, but the Secretary paid for all expenditures, and the business of the Board was conducted through those months without any further aid.

The Inspector of Fruit Pests also carried on his investigations during that time without being compensated for all materials purchased, etc.

The horticultural pursuits in this State are very rapidly increasing, and never before has such a rapid increase been witnessed as that of the past two years. The mailing list of this office in 1885 was about seven thousand five hundred; the mailing list of the present year numbers over twelve thousand. Therefore the time has arrived when a larger appropriation is needed, or with such a rapid increase, it will be impossible for this Board to keep within bounds of the present appropriation, which is entirely inadequate to its wants. Having to move into larger quarters, our rent became more than double than formerly, as also our freight, express, and postage bills, as the following figures show:

Thirty-eighth Fiscal Year.

Printing.....	\$2 75
Furniture.....	42 50
Papers, subscription to.....	15 20
Telegrams.....	90
Coal.....	16 75
Books.....	241 60
Expressage.....	27 07
Postage stamps.....	56 05
Messengers.....	14 00
Spraying apparatus.....	4 50
Microscope.....	250 00
Stenographer.....	225 00
Lithographing.....	470 00
Janitor, twelve months.....	62 00
Rent—eleven months at \$30, and one month at \$40.....	370 00
Traveling expenses of the Commissioners.....	442 52
Traveling expenses of the Inspector of Fruit Pests.....	782 45
Salary Inspector of Fruit Pests.....	2,400 00
Salary Secretary.....	1,800 00
Sundries.....	14 00
Total.....	\$7,237 29
State appropriation.....	\$10,000 00
Balance turned back into Treasury.....	\$2,762 71

Thirty-ninth Fiscal Year.

Printing	\$153 50
Furniture	469 73
Papers, subscription to	91 77
Telegrams	18 55
Coal	15 65
Books	313 57
Expressage	170 13
Postage stamps	650 78
Messengers	3 65
Spraying and gas apparatus	81 15
Stenographer	425 00
Lithographing	153 90
Janitor, twelve months	98 30
Rent—one month at \$40, eleven months at \$85	975 00
Traveling expenses of the Commissioners	430 00
Traveling expenses of Inspector of Fruit Pests	533 70
Sketching	60 00
Wood cuts	51 00
Electrotype cuts	10 85
Cartage	51 55
Carpenter work	113 00
Chemist	55 00
Clerk salary, six months	210 00
Office boy, four months	95 00
Freight	105 39
Painting	73 75
Stationery	261 13
Gas	6 55
Extra help	30 50
Boxes for sending out reports	37 00
Papering	25 25
Window awnings	26 00
Sundries	13 65
Salary, Inspector of Fruit Pests	2,400 00
Salary, Secretary	1,800 00
Total	\$10,000 00
State appropriation	\$10,000 00

I desire to say, in conclusion, that it is needless to mention that the limited funds at our command have been very economically and judiciously expended, as the above figures show.

Before closing, I desire to extend my warmest thanks to our esteemed President and my colleagues for their uniform courtesy, friendship, and regard to one who has been their Treasurer, and who has acted in that capacity for the best interests subserved since the inception of this Department.

Very respectfully submitted.

M. G. VALLEJO, Treasurer.

REPORT OF THE SECRETARY.

[SUBMITTED AND APPROVED BY THE BOARD AT THE MEETING OF
JULY 2, 1888.]

*To the honorable the Officers and Members of the State Board of Horticulture
of the State of California:*

GENTLEMEN: I herewith submit to your kind consideration this, my report for the thirty-ninth fiscal year, just closed.

PUBLICATIONS.

During the past year many reports and bulletins have been issued by this Board, which have been of great value to the horticulturists of this State; besides these, there have been issued monthly bulletins of inquiry, and by so doing we have been enabled to report the condition and progress of the industry in every month of the year. The reports published within the past year are as follows:

- Biennial Report for 1885 and 1886, with Appendix for 1887. Ten thousand copies.
- Synopsis of the Proceedings of the Eighth Fruit Growers' Convention, held at Santa Rosa, November, 1887. Five thousand copies.
- A Treatise on Citrus Culture in California, by the Secretary. Five thousand copies.
- Bulletin on Remedies Recommended at the Seventh State Convention of Fruit Growers. Five thousand copies.
- Bulletin on Remedies Recommended at the Eighth State Convention of Fruit Growers. Five thousand copies.
- Bulletin on Olive Culture, by the President. Five thousand copies.
- Bulletins Nos. 4, 5, 6, and 7, by the Inspector of Fruit Pests. Of each, five thousand copies.
- Official Report of the Ninth State Fruit Growers' Convention. Five thousand copies.

These publications have been mailed to all those who have applied for them, and to those on the regular mailing list; copies have also been sent to all public institutions in this State. I have also exchanged with all the horticultural societies and colleges of agriculture in the Eastern States, and with many such institutions in foreign countries.

The demand for these reports in this State has been very large, and the reports being so large and heavy the postage on them has been very great. The demand for them still continues and applications are received daily. The issue of 1885-6 is nearly exhausted; there are still in this office a few copies for distribution and for use of the incoming Legislature. A great many applications are received from other States almost every day, and also from foreign countries, but in the absence of special directions in the statutes, I have had to exercise discretion in the mailing of reports to persons outside of the State, and believing that said reports are for this State only, and for this and other good and sufficient reasons, many applications from other States have not been filled.

OUR THIRD BIENNIAL REPORT.

Our biennial year has just closed, and on or about August first I will forward to the State Printer, to be printed, the biennial report of this Board

for the years 1887 and 1888. In justice to myself and the State Printer, I ask that all reports and essays to be embodied in said report be presented to the Secretary before the twentieth of the present month.

This will be a valuable edition, as it will contain the reports of the State Inspector of Fruit Pests, in which will be given the description of the various new insect pests discovered in the past year, with illustrations of the same, and also all remedies experimented with, and the results thereof.

This work will not only be instructive, but will be a guide for amateurs in the study of entomology. It will also contain the report of the Treasurer and the report of the Secretary.

Besides these there will be other very important papers on different subjects, with illustrations of new fruits and several colored lithographic chromo plates; also the official report of the proceedings of the Eighth and Ninth State Fruit Growers' Convention. I expect to have this most valuable edition ready for distribution before the meeting of the incoming Legislature.

A TREATISE ON CITRUS CULTURE.

There being considerable inquiry about the propagation of citrus fruits, and of varieties, lemon curing, etc., and as no book has been published treating on the latest improved methods of curing, etc., I imposed the task upon myself, and have prepared a little book on the subject, of which there have been printed five thousand copies. In its preparation I devoted all my spare time, which was very limited, but by giving part of my time to it evenings I succeeded in its completion. The thanks of this Board are due to the Superintendent of the State Printing Department for the able manner, neatness, and promptness in which this work was executed.

A REVISED EDITION.

I will soon commence to work on a revised edition, which I may possibly complete before the end of the present fiscal year. While these investigations have greatly added to my duties, they have not been without interest, and I am happy if anything I have accomplished has aided the progress of horticulture in the arrangement of those chapters.

REPORTS RECEIVED.

The following reports have been received in exchange with the Horticultural Societies in the Eastern States and elsewhere; also, Colleges of Agriculture, etc. These reports have greatly added to the value of our library, as they contain the proceedings in full of all the horticultural meetings held in the Eastern States within the past four years, and also information on almost every subject bearing on horticulture:

Illinois State Horticultural Society, 1886-8.
 Iowa State Horticultural Society, 1886-8.
 Indiana State Horticultural Society, 1886-7.
 Kansas State Horticultural Society, 1886-8.
 Arkansas State Horticultural Society, 1886-8.
 Michigan State Horticultural Society, 1887.
 Massachusetts State Horticultural Society, 1886-8.
 Massachusetts College of Agriculture, 1886-8.
 Colorado State Horticultural Society, 1886-7.
 California Agricultural Society, 18 volumes, from 1859 to 1888.
 Michigan State Horticultural Society, 1886-7.
 Kentucky State Horticultural Society, 1886-8.
 University of California, 1886-8.
 Ohio State Horticultural Society, 1886-8.

Minnesota State Horticultural Society, 1886-8.
 Missouri State Horticultural Society, 1886-8.
 Mississippi State Horticultural Society, 1886-8.
 Smithsonian Institute, 1885-6-7-8.
 Nebraska State Horticultural Society, 1886-8.
 Department of Agriculture, 1886.
 New Jersey State Horticultural Society, 1886-8.
 Entomologist of New York, 1885-6.
 Entomological Society of Ontario, 1887.
 Entomologist of the State of Illinois, 1886-8.
 Georgia State Horticultural Society, 1886-8.
 Statistician, Washington, 1887.
 Arsenical Poisons, by S. A. Forbes, 1887.
 Bureau of Animal Industry, 1887.
 North Carolina Fruit Growers' Association, 1886-8.
 Forestry in Europe—Reports by the United States Consuls.
 Gulf States Fruit Growers' Association, 1886-8.
 Royal Horticultural Society of Victoria.
 Western Tennessee Horticultural Society, 1886-8.
 Royal Commission on Vegetable Products of Victoria, 1886.
 Wisconsin State Horticultural Society, 1886-7.
 North Carolina State Horticultural Society, 1886-7.
 Western New York Horticultural Society, 1886-8.
 Horticultural Products of Paris, by Chas. Joly, 1888.
 Northern Illinois Horticultural Society, 1886-7.
 Statistical Abstract of the United States (Ninth Number), 1888.
 Central Illinois Horticultural Society, 1886-7.
 Montreal (Quebec) Horticultural Society, 1886-8.
 Northern Texas Horticultural Society, 1886-8.
 American Pomological Society, 1886-7.
 American Forestry Congress, 1886.
 American Horticultural Society, 1886.
 Western Mission Horticultural Society, 1886.
 Forestry in Kansas, 1886.
 Nova Scotia Fruit Growers' Association, 1886.
 Fungus Diseases of the Vine, by F. Lawson Scribner, 1888.
 Abbottsford (Quebec) Fruit Growers' Association, 1886.
 Railroad Commission of California, 1887.
 Labor Commissioner of California, 1886.
 Fruit Growers' Association of Ontario, 1886.
 Bulletin No. 1, Department of Agriculture, 1888.
 Report of Department of Agriculture, 1887.
 Report of University of Illinois, 1888.
 Consular Reports, full set, 90 vols.

COUNTY HORTICULTURAL SOCIETIES.

There being no Horticultural Societies or Clubs in many fruit-growing counties throughout the State, I have been unable to ascertain the fruit prospects of those counties when most needed, or to impart information to them at the proper time.

The formation of local bodies is of the utmost importance, as there is many a problem that confronts the orchardist that they could well counsel over with profit to themselves; I therefore urge the formation of Horticultural Societies or Clubs in all districts where fruits of any kind are grown, and, when thus organized, to forward to this office the name of the organization, name and the addresses of its officers, to be placed upon a register kept for that purpose.

CORRESPONDENCE.

The correspondence for the last year has by far exceeded my power to answer in full detail with the limited time and assistance at my command. There has been considerable inquiry upon all subjects from every part of this State, and from many other States and foreign countries. The correspondence with Ministers and Consuls in foreign countries has been with a view of ascertaining all the information upon kindred subjects

that would aid the horticulturists of this State. This information I had intended to publish in our forthcoming biennial report, but as considerable time is required to obtain the same, it will appear later in pamphlet form.

MEMORIALS TO CONGRESS.

In accordance with resolutions adopted at the various Conventions assembled at Riverside, April, 1887, at Santa Rosa, November, 1887, and at Santa Barbara, April, 1888, I have forwarded to all the Senators and Representatives at Washington copies of the various resolutions adopted. I have received answers from many of them, especially from the Senators and Representatives of our State, that they would give the various matters their consideration.

DEFICIENCY BILLS.

In accordance with your instructions of last meeting, I forwarded to the State Board of Examiners all the deficiency bills, to the amount of \$1,145 83, together with the following:

SAN FRANCISCO, December 20, 1887.

Honorable State Board of Examiners:

GENTLEMEN: Inclosed please find demands against the State Board of Horticulture, contracted by said Board by mistake between April and July 1, 1887, during which time the said Board had no funds to draw upon for any expense whatever, the last appropriation having exhausted April 1, 1887, and the new appropriation not becoming available until July 1, 1887. It was in this hiatus that these bills were contracted. The Board, at their meeting held in this office November 7, 1887, passed the following resolution:

"Resolved, That the Secretary be instructed to forward all the bills contracted between April 1 and July 1, 1887, to the honorable the State Board of Examiners, with the request that the same be approved by them, and that they transmit the same to the Legislature as deficiency bills against this Board."

The bills are as follows:

F. Chester, for rent May and June, 1887	\$80 00
California Patron, one year's subscription	2 00
Wm. McDonald, Janitor for April	5 00
J. Chester, office expenses	10 70
R. H. Follis, rent for April, 1887	30 00
A. S. Chapman, traveling expenses	45 00
A. Block, traveling expenses	64 45
Ellwood Cooper, traveling expenses	66 53
J. Chester, traveling expenses	71 75
E. Kimball, traveling expenses	75 20
N. R. Peck, traveling expenses	89 00
M. G. Vallejo, traveling expenses	107 20
L. M. Holt, incidental expenses	148 00
J. Barrows, reporting Seventh Convention	150 00
W. G. Klee, traveling expenses	201 00
Total	\$1,145 83

I hope that the above claims will receive your unanimous approval, and that you will recommend their payment to the Legislature.

Very truly yours,

B. M. LELONG, Secretary.

Since then I received information through their Secretary that the bills have been passed upon, and that they would be transmitted to the Legislature, with the recommendation that they be paid, and that interest be allowed on them from the time they were contracted.

FURNITURE.

The following articles have been added to the rooms within the past year; the utmost care has been exercised in whatever has been purchased, that they be of the best quality and most serviceable as well as ornamental.

The system I have adopted in keeping the rooms in order works to perfection, *i. e.*, allowing nothing to be misplaced:

- One large desk for the Secretary.
- One chair for the Secretary.
- One cabinet desk for the Inspector.
- One microscope stand for the Inspector.
- One chair for the Inspector.
- One minor stand for the Inspector.
- One table for the Inspector.
- One water filter and stand.
- One type-writer.
- One table for type-writer.
- One table for committee room.
- Two tables for newspapers.
- One blackboard.
- Two frames for chromo lithographs (orange plates).
- One frame (engraving).
- One frame (Governor Waterman's picture).
- One copying press.
- One copying press stand.
- One umbrella stand.
- One clock.
- One barometer.
- One balance.
- One President's stand.
- One flagpole.
- One flag.
- One large street sign.
- One specimen cabinet.
- One pedestal.
- One department seal.
- One truck.
- One stepladder.
- One packing table.

Besides these many small articles have been bought which were absolutely necessary; also the fine carpet that adorns the rooms. The rooms are always kept in the order that you now find them.

NEW BOOKS.

The following list of new books has been added to the library within the past year; the volumes are mostly large books:

- Encyclopædia Britannica, vols. 21, 22, and 23.
- Encyclopædia Americana, vols. 1, 2, and 3.
- The Riverside Natural History, by John Sterling Kingsley, 6 vols.
- Hand Book on Orange Culture, by T. W. Moore.
- Orange Culture, by T. A. Garey.
- The Rose Culture, by Ellwanger.
- Floriculture, by Peter Henderson.
- Orange Culture, by W. A. Spaulding.
- Treatise on Citrus Family, by Geo. Gallesio.
- Treatise on Olive Culture, by Adolph Flamont.
- Half Hour with Insects, by Packard.
- New Zealand Scale Insects, by Maskell.
- Guide to Study of Insects, by Packard.
- American Newspaper Annual, 1887.
- Entomology (in German), by Brebnis.
- San Francisco Directory, 1887 and 1888.
- Pacific Coast Directory, 1887 and 1888.
- Strawberry Culture, by Barnard.
- Fruit Culture, by Barry.
- Practical and Scientific Fruit Culture, by Baker.
- Queensland's Horticultural Industries, by Bernays.
- Fruit Preserver's Manual, by Culver.
- American Fruit Book, by Cole.
- Orange Culture, by Davis.
- Selected Fruit, by Downing.
- English Plant Names, by Earl.

Small Fruit Culture, by Fuller.
 Practical Floriculture, by Fumer.
 Florida Fruits, by Harecourt.
 Strawberry Culture, by Longworth.
 The Orchard, by Rivers.
 Chemistry, by Stockhardt.
 Cryptogamic Botany, by M. C. Cooke.
 Microscope Fungi, by M. C. Cooke.
 Insect World, by Figuier.
 Arcana Entomology, by Westwood, 2 vols.
 Wonder of Insect Life, by Willet.
 Olive Culture, by Cooper.
 Olive Culture, by Pohndorff.

Codes.

Second California Civil.
 Third California Statutes.
 Fourth California Penal.
 Fifth California Statutes.
 Sixth California Statutes.
 Seventh California Statutes.
 Political, 1885.
 Civil Procedure, 1885.

Reports, Books, etc., Distributed and in Library.

Total number of books, reports, etc., in the library, 2,474.
 Total number of reports, treatises, etc., on hand for distribution, 16,800.
 Total number of reports, treatises, etc., distributed in the past year, 15,200.
 Total number of bulletins distributed in the past year, 35,000.
 Total number of bulletins on hand for distribution, 4,000.
 Total number of circulars issued, 45,000.

Agricultural and Horticultural Papers.

American Agriculturist.
 Alhambra.
 Canadian Horticulturist.
 California Fruit Grower.
 California Florist.
 Country Gentleman.
 Farm and Home.
 Farmer and Fruit Grower.
 Farm and Garden.
 Farmers' Home Journal.
 Farmers' Review.
 Farm and Fireside.
 Green's Fruit Grower.
 Indiana Farmer.
 Kansas City Journal and Agriculturist.
 Prairie Farmer.
 Pacific Rural Press.
 Pacific Fruit Grower.
 Rural Home.
 Rural New Yorker.
 The Ladies' Floral Cabinet.
 The World.
 The (Redlands) Citrograph.
 Riverside Press.
 Santa Clara Valley.

LITHOGRAPHIC PLATES.

I would recommend that you lay aside a sum not less than \$1,000 for the purpose of illustrating new fruits, etc., for the biennial report, provided this work cannot be done by the State Printing Department.*

* Referred to the Executive Committee, with full power to act. The committee approved of the recommendation.

CRYSTALLIZED FRUITS.

I have tried in every possible way to furnish the public with all the information I could obtain in the methods of crystallizing fruits, etc.

In view of the fact that the method is kept a secret, I have offered a premium of \$20 for the best paper on crystallizing fruits,* and \$10 for the second best paper, the papers to be read before you, and that you decide who is entitled to the prize; the papers to contain not less than one thousand five hundred words, and to give the method of crystallizing in full.

STATE CONVENTION OF FRUIT GROWERS.

The fruit growers of California, in Convention assembled at Santa Barbara, April, 1888, adopted by unanimous vote a resolution requesting your honorable body to hold the next Convention of fruit growers in the town of Chico, in November next. In considering this resolution, and, if approved, I would recommend that committees be appointed, and also essayists.†

COMMITTEES.

There should be at this time two legislative committees appointed—one to frame a bill to be presented to the Legislature on general laws relating to insect pests, etc.; the other on appropriation and revision of the present laws, etc. Similar bills failed to pass at the last meeting of the Legislature. This was partly due to the fact that the committees in charge did not act until very late, and so were unable to have the bills introduced at the early opening of the session. I would, therefore, recommend their appointment at this meeting.

SEAL.

I have designed a seal for the use of this department, and I recommend its adoption.‡

WHAT WE NEED AND SHOULD HAVE.

I believe that the law governing this Board should be so amended, and an appropriation made for the following purposes:

First—To employ an Agricultural Chemist, whose duties should be to carry on experiments with remedies, compounds, etc., throughout the year, in various sections of the State. This is of the greatest importance, for it is a fact that orchardists, as competent as they are, often destroy the effectiveness of many experiments made by them, for the reason that they are not competent to judge what chemical it is that destroys the one they have been so successful with. As evidence of this, I need only cite the instance where in Los Angeles County many fruit growers carried on a series of experiments for several years, although they succeeded in discovering many cheap and effective remedies, were at a loss to know how to further the ones they had so found, and in trying to do so destroyed the value of the former. This was so with the gas remedy. After they had found the chemical that was effective, they could not go ahead because they did not know how to prevent it from injuring the tree; this remained

*The Board awarded the premium to J. J. Pratt, of Yuba City. See supplement to report of Secretary.

†The Board resolved to hold the next Convention at Chico, and instructed the Executive Committee to make all the necessary arrangements.

‡Adopted.

so until the services of a chemist were sought. The chemist, knowing his business, at once knew what to do, and accomplished what was desired, *i. e.*, the killing of the insects without injuring the tree or foliage.

I have from time to time received communications from fruit growers, offering to donate to the Board plots of infested orchards where experiments could be carried on.

Monthly reports could be published, giving the results of all experiments made.

Second—Statistical correspondents.

I cannot find the means by which I can collect reliable information of the actual condition of the horticultural interests of the State, and also statistics. I have tried every possible way. Not being able to leave the office, I tried to do so by correspondence, but regret to say that my efforts in this direction have been in vain, as few people can be had who will devote part of their time to the answering of many impertinent questions without compensation; therefore, I believe that the Legislature should be appealed to for aid in the establishment of statistical correspondents throughout the State. Believing these matters to be of the utmost importance, I submit them to your kind consideration.

INSPECTOR OF FRUIT PESTS.

It is hardly necessary for me to comment upon the valuable services performed by this officer, as you are, no doubt, well aware of the great amount of knowledge he has disseminated throughout the State. In his department much has been accomplished in the past two years. In fact, that orchardists have succeeded, by his aid, in saving 90 to 98 per cent of their crops, is enough to substantiate this statement, and therefore needs no comment from me. He is now experimenting in propagating parasites, which, in their native countries, have kept the baneful insect pests among us in check. Already various lots have been imported, with a view of distributing them throughout the State as soon as it is known that they accomplish the purpose intended. He has also constructed an apparatus for fumigating trees with chemical gases, which is the most complete of its kind ever made, and is now carrying on a series of experiments to further, if possible, this most important remedy.

I have, at all times, received from him very kind and prompt assistance on many matters not directly of my department. For this I owe him my many thanks, and I cheerfully bear testimony to the faithfulness, efficiency, and discretion which has characterized the labors of your efficient Horticultural Officer.

STATE DEPARTMENTS.

My thanks are due to the various departments at Sacramento, their clerks and deputies, for the valuable assistance in furnishing me with information which they have at all times been ready to impart.

THE OFFICE.

I have felt the gravity of the responsibility which has been delegated to me, and have moved with the most careful and earnest desire to accomplish all that in me lay to bring out of the situation the largest and best results attainable. What might have been done had the demands of this Board been sustained by the Legislature, as they had a right to expect, and as the true interests of their constituents demanded, I leave you to discern.

AN EXECUTIVE SESSION.

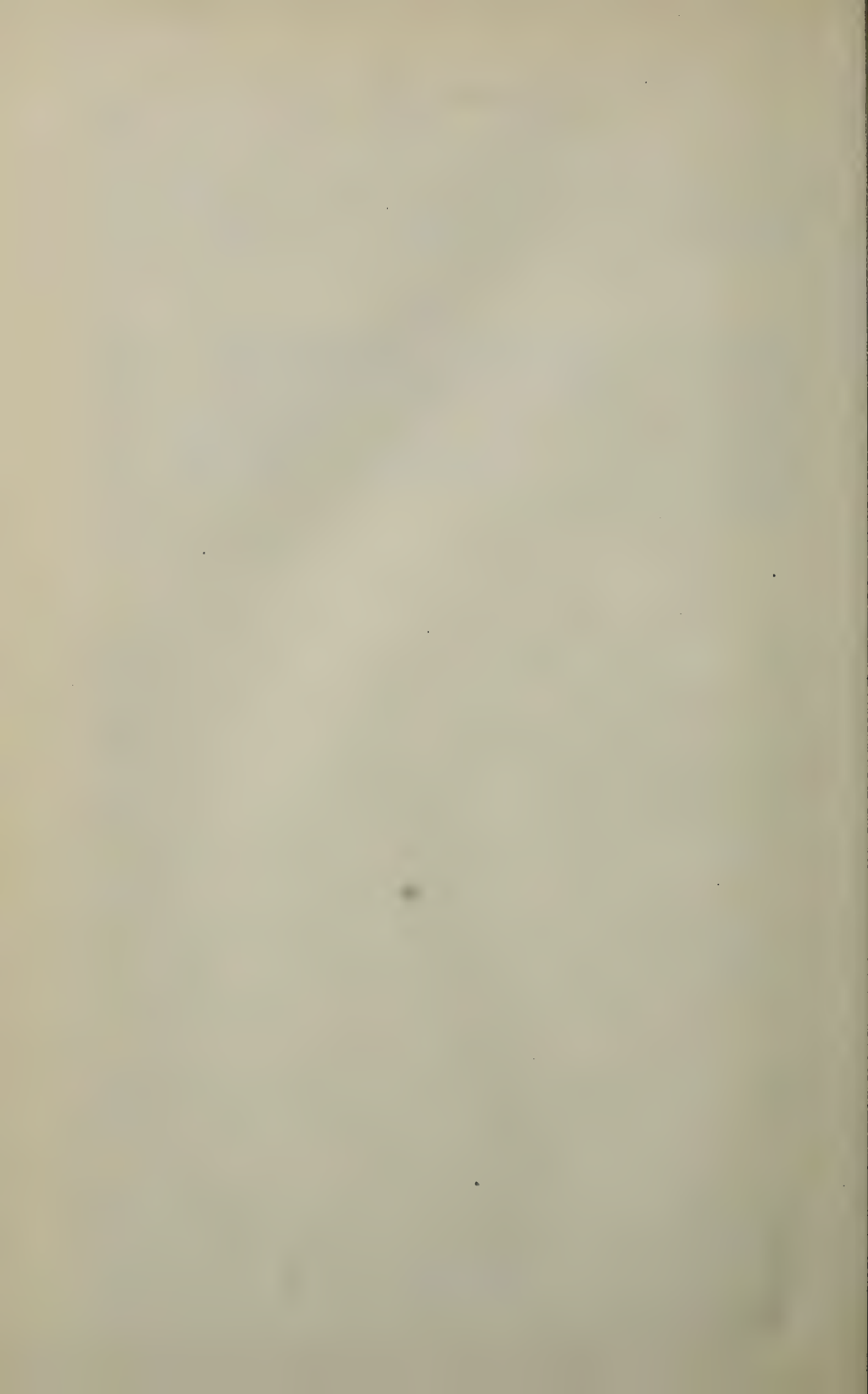
I have other important matters to lay before you, but as I do not know whether you desire to make them public, I would recommend that after you have heard the reports of the various officers that you resolve yourself into an executive session to consider them.

CONCLUSION.

I cannot close this brief report of the doings of this department without recognizing the very valuable assistance and uniform courtesy shown me by our esteemed President and the honorable Commissioners while in the discharge of my official duties as Secretary. In expressing a proper sentiment of pleasure, such as it gives one like myself under like circumstances, even the pen often fails to properly perform its duty—such is this case—and I will therefore close, simply thanking them, but taking this opportunity to express my high appreciation for the valuable services they have gratuitously rendered the public.

Very respectfully submitted.

B. M. LELONG, Secretary.



SUPPLEMENT

TO THE

Report of Secretary of the State Board of Horticulture.

The Olive, the Orange, the Lemon, Deciduous Fruits, Etc.

EXPLANATION OF PLATES TO REPORT OF SECRETARY.

PLATE No. 1.

Valencia Late Orange.—Section cut crosswise shows thickness of rind, texture, and quantity of seeds generally found in specimens. The picture is natural size.

PLATE No. 2.

Maltese Blood Orange.—Section cut crosswise shows thickness of rind, and as they generally are, "seedless," and with blood-mottled flesh.

PLATE No. 3.

Paper Rind St. Michael.—Section cut crosswise shows the amount of seeds they generally contain, also thinness of rind, and natural size of fruit.

PLATE No. 4.

- The Olive*.—Fig. A. Branch of Mission olive, showing size of fruit.
Fig. B. Mission olive, cut lengthwise, showing size of pit, and thickness of flesh.
Fig. C. Picholine olive, natural size.
Fig. D. Picholine olive, showing size of pit, also thickness of flesh.
Fig. E. Pendoulier* olive, natural size.
Fig. F. Pendoulier olive, natural size, showing thickness of flesh, curve, and size of pit.

I am under great obligations to Minnie V. Lelong, artist, No. 325 Golden Gate Avenue, San Francisco, for the above paintings, taken from nature. They are as correct as they can possibly be made. (Secretary.)

* Incorrectly spelled "Pendulier."



VALENCIA LATE.



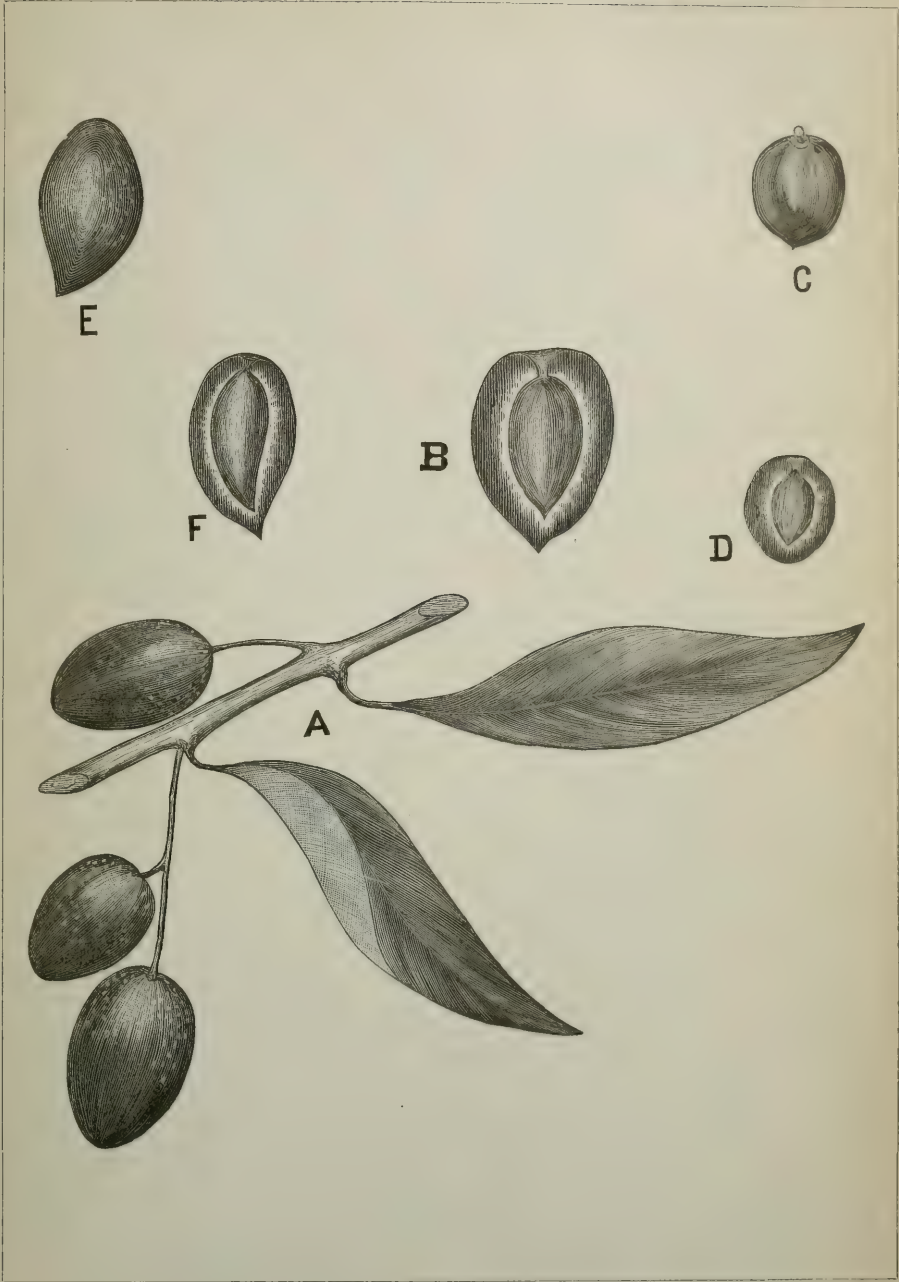


MALTESE BLOOD.



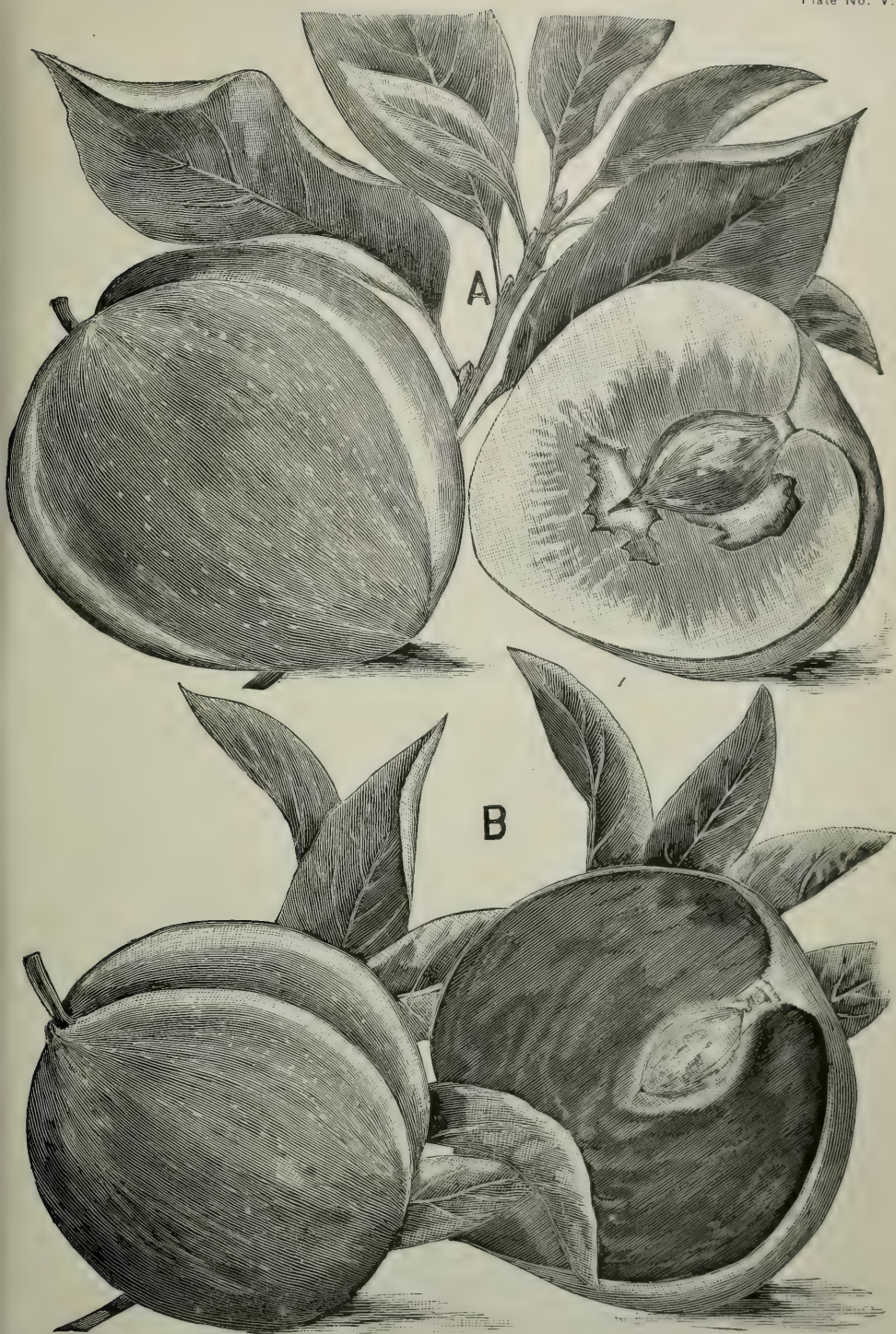






THE OLIVE.





From a Painting of PROF. H. E. VAN DEMAN.

A. KEISEY.
B. SATSUMA.

JAPANESE PLUMS.



SUPPLEMENT TO THE REPORT OF SECRETARY.

The Olive: Varieties, Opinions, Mission vs. Picholine, Pendoulier. Japanese Plums: Satsuma and Kelsey. The Orange: Valencia Late, Maltese Blood, Paper Rind St. Michael, Mediterranean Sweet, Wolfskill's Best, Satsuma, Pomeo, Bidwell's Bar Orange. The Lemon: Curing of, Processes, Sulphuring, Budding, Renewing Old Trees, Budding into Large Limbs. Diseases of the Orange and Lemon: Remedy; Cause of Gum Disease. Cutting the Top of Gum Diseased Trees. Pruning: Advantages of Low Trained Trees; Extending the Roots of Trees in Planting. Plums and Prunes: Nomenclature of Prunes; French Prune Driers. The Apricot in France. How Prunes Should be Handled; Flattening of Prunes; Naming our Prunes. The Apricot: Soil and Climate, Varieties, The Shot Hole Fungus, Propagation and Planting. The Peach: Its Culture and Marketing, What to Plant. Table Grape Culture. Crystallized Fruits: The Method. Fruit Drying.

THE OLIVE.

The culture of the olive has become one of the regular industries of this State, and of the great future which awaits it there is no doubt. Olive oil making cannot be overdone; as the production increases so will the demand, and there cannot be enough produced to supply the demand for many years to come. Many new plantations have been started all over the State, and many more would have been started if the trees or cuttings could have been obtained.

In the interior valleys many large olive orchards have been planted; these trees are young, and many have begun to bear fruit this year. There is no doubt that in a few years there will be an abundance of olive oil produced in this State, as all these plantations are doing exceedingly well, and are planted on soil well adapted to their culture.

VARIETIES.

At present there are but two varieties most largely grown, that is, the Mission and the Picholine. The planting of the Mission is much advocated by many, because the fruit is a large berry and the tree a rapid grower. The latter is also strongly recommended because it is an early olive, ripening much ahead of the Mission, and it is claimed to produce a much richer oil. (See illustrations in Plate No. 4.) That which I have sampled does not substantiate this statement, although this is hardly a fair test, because the quality of the oil greatly depends in the manner in which it is made. It is claimed that the advantage the Mission has over the Picholine is, that while it may not bear such heavy crops, that the fruit being larger, is much easier and cheaply gathered; while on the contrary, those who advocate planting the Picholine say, "That while the tree does not grow so large, that it is a good, regular bearer, and that the fruit is easily and cheaply gathered on cloths." In answer to various letters which I addressed to those growing the Mission and the Picholine, not two letters agreed. The opinions formed were about as follows:

From Sonoma County.

"Both have advantages. The Mission will perhaps grow on a drier and poorer soil than the Picholine olive. This statement, though not fully proven, seems probable from experiments in this and several of the south-

ern countries. The Picholine, however, grows with great vigor on any sandy soil.

"The greatest fault with the Mission in this part of the State is the late and uneven ripening of the fruit. Last fall a large portion of the crop was destroyed by the frost. The early and even ripening of the Picholine alone would be sufficient recommendation, but in addition to this it bears a regular annual crop, which is very easy to gather, as the branches droop with the weight of the fruit, which separates easily, and may be stripped on cloths at a slight expense."

A Grower in the Same District.

"In 1875 he rooted about one hundred trees of the Mission variety. They commenced to bear fruit in 1879. That year he picked a few berries from them. In 1880 he set out rooted trees of the Picholine variety, and the first trees to bear was last year, when about a pint of berries was picked from each tree. Trees of the Mission, planted the same year and time that the Picholine were planted, are three times the size of the Picholine. Both varieties are on the same kind of land, and receive the same kind of treatment."

From Placer County.

"At this place there are two eight-year old trees (a Mission and a Picholine) standing only fifteen feet apart, and having had always the same care. Last season the Mission yielded forty-nine pounds of berries, while the Picholine gave sixty-three pounds. This season the Mission has hardly any fruit, while the Picholine was considerably more loaded than last year. The Picholines in 1887 were gathered on November first; the Missions were gathered just before Christmas, and then they were but three fourths ripe."

From Los Angeles County.

"The Picholine is a regular and abundant bearer, but the fruit is no larger than a cranberry, and very tedious to pick. It is not good for pickles, the stone being too large in proportion. But it is a sweet olive when ripe, and the stone is full of oil, and I doubt not it would be profitable for oil. The Mission fruit is much larger, perhaps four times the weight of the Picholine, and makes splendid pickles."

Letters from other localities contained about the same information as the above; what one advocated the other was sure to disagree on the very point he had been so careful to write. Perhaps it is well to here leave this subject rest until I shall have obtained the experience of the olive growers of another year.

The Mission, however, has done well in this State, and has produced an oil that, in my opinion, cannot be excelled, and which has begun to attract the taste of the eastern consumers.

The consumers of imported adulterated oil are now beginning to rebel against it, and seek for that which is pure and healthy.

The Mission is a rapid grower, and commences to bear young, does well in this State, and can be found growing in almost every district from the extreme northern to the extreme southern part of the State.

New varieties require considerable time to be tested, and when the fact has been clearly demonstrated that better and more productive varieties are fruiting in this State, then it is an easy matter to bud or graft the trees having a thrifty and healthy stock to start with.

PENDOULIER.

Mr. L. P. Rixford, of Sonoma, imported this variety from France some ten years ago. The original label was lost, therefore doubts were entertained of it being the Pendoulier. Professor Gustave Eisen pronounced it the Pendoulier after investigating the tree and fruit at Mr. Rixford's place. I also showed specimens of the fruit to Mon. Adolphe Flamont, who immediately pronounced it to be the Pendoulier, and said that it was a most highly prized olive, both for pickles and for oil. The sample of oil expressed from this olive is the sweetest I have yet tasted; it was also so pronounced by those who have sampled it. The fruit is somewhat smaller than the Mission (see illustration F and E in Plate No. 4). The pit is small and slender, with a curve, and a very sharp point. It ripens even and much ahead of the Mission. The tree is a rapid grower, being equally as large as the Mission of the same age.

JAPANESE PLUMS.

Recently many new varieties of plums have been introduced from Japan. The fruit of most of them resemble our Wild Goose and Cherry plums; most of them have been given new names after having fruited here, for it has been very difficult to distinguish them by the names (Japanese) under which they were imported.

SATSUMA PLUM.

Introduced by Luther Burbank, of Santa Rosa, three years ago from Southern Japan. It is an excellent plum of very fine appearance. The flesh is of a solid, clear purple color from skin to pit. The pit is very small, and clings very tight to the flesh.

The fruit is somewhat larger than the Kelsey, and more globular, richer and better flavored. Ripens from five to six weeks ahead of the Kelsey. The tree is a vigorous grower; has large dark green leaves. This year it ripened from July twentieth to August first.

KELSEY.

This plum continues to bear well, and promises to become a popular variety in our markets. The flesh is quite firm, of a delicate yellow color; a cling-stone. Fruit is of excellent quality, quite highly flavored. Tree an upright and a thrifty grower. The leaves are rather narrow, somewhat like the Wild Goose plum. The tree is quite tender, and will not flourish in a cold climate; therefore it is well adapted to our State, as our warm climate is most favorable to its culture.

THE ORANGE.

The culture of this tree in this State is rapidly increasing, and many new orchards have been started within the past year. So large has been the demand for good trees, that all the nurseries in the past two years became entirely exhausted of all good stock for orchard planting.

There seems to be but three States in the Union best adapted to the growth of citrus fruits, *i. e.*, Louisiana, Florida, and California.

The main crop of Louisiana ripens from November first to February first, that of Florida from December first to March first, and that of California from February first to July first.

The Panama orange crop cuts no figure as a competitor, because the crop is picked green for shipment to undergo the voyage. This fruit is not attractive in the least, as it arrives in an unnatural color, and very poor in quality.

That from the Mediterranean, and that from Mexico, comes into the market when it cannot materially affect the trade.

The competition the California crop meets with is but little, coming in, as it does, when all others are practically out of the market.

Those wishing to embark into the business, and wishing information on the subject, I most respectfully refer them to the report of Chief Pomologist, Prof. H. E. Van Deman, 1887, and to Bulletin No. 1, of the Pomological Division, and also a "Treatise on Citrus Culture in California" by myself, as want of space at the present time prevents a more extended account of this most important industry.

There being considerable inquiry at the present time as to the most profitable varieties, the accompanying plates have been issued in answer thereto.

VALENCIA LATE.

A remarkable variety, which has fruited in this State for five or six years, was originally planted in San Gabriel, where it has done remarkably well.

The tree is a rapid grower, and promises to become suited for standard orchard purposes.

It does not commence to bear young, but until it has attained quite a good size, and able to support the weight of the fruit; as a rule, most of the foreign varieties commence to bear when very young, often a year from the bud, which is a detriment to the health and growth of the tree.

Such trees if allowed to bear, will tend to remain low and bushy, as if apparently stunted. After a tree has been allowed to remain so for several years, it is very difficult to force it to grow upwards, or make a standard tree of it; its tendency will always be to branch out, and to become low and bushy, even when heavy pruning has been resorted to.

The fruit is pale yellow, of the St. Michael type, and very firm (Plate No. 1), oblong shape, size medium to large, with few seeds, medium thorny, with a decidedly high flavor, and very juicy, ripens late—May and June.

Since the issuance of my "Treatise on Citrus Culture," I have received a great many letters asking "of what good would it be to grow an orange that would ripen in June when it would then be out of the orange season; that other fruits are in then which are in their season." To this I can only say: "That although it seems out of season because the orange ripens in June, and really it would be if the orange was an early variety, but ripening in the month of June is in season then, and its flavor is as fine as that of an early orange in season in the month of March; and what more, the markets then demand an orange that is in season at that time, which is when all the early varieties are out of the market."

MALTESE BLOOD.

This is one of the most popular of the many varieties grown in this State. Unfortunately many inferior varieties have been sold under the

name of Maltese Blood, and the fault lies, to a great extent, with orchardists buying trees propagated from trees imported under that name, before they had borne any fruit, which afterwards proved to be of inferior quality. Of the many varieties grown under similar names, but few resemble the true type, and those that do are without any coloring whatever; others show a slight trace of coloring, but the habit of the tree is entirely different, as also the fruit.

The true Maltese Blood (Plate No. 2) is oval in shape, of medium size, with a decidedly fine texture and flavor; the pulp is marked and seems to be streaked and mottled with blood, is nearly seedless, and the tree is thornless.

The tree is of a dwarf habit, and can be set close together in orchard form; many growers bud this variety into the limbs of large trees, that is, trees that have been planted four or five years in orchard form, and in this way a large tree is produced of a dwarf variety, and the quantity of fruit enhanced.

PAPER RIND ST. MICHAEL.

This is a remarkable and popular variety. The tree is of a dwarf habit, medium thorny, and a prolific bearer; the fruit keeps well on the tree, and does not drop when mature, as other varieties do; it also retains its flavor until quite late in the season.

The fruit is medium small, round, and very firm and juicy. (Plate No. 3.)

Color, pale yellow; with a very thin rind. It grows very uniform in size, which is a great advantage in packing, as they do not require any assorting. This variety can be made more productive by being budded on large stock. All dwarf varieties do better when so worked, because it is difficult to make standard trees of dwarf varieties, when they have to grow and make their own stock; but by budding them into large trees this difficulty is avoided.

MEDITERRANEAN SWEET.

(Figure No. 1.)

Fruit medium to large; pulp and skin of fine texture; very solid and few seeds; ripens late, often not until May or June. The tree is thornless, and of a dwarf habit of growth; inclined to overbear. This variety is now well known, and much sought for in our markets. It was originally introduced by T. A. Garey, of Los Angeles.

WOLFSKILL'S BEST, OR FAVORITE.

(Figure No. 2.)

Originated by J. W. Wolfskill, of Los Angeles. A good grower. Original tree stands over thirty feet high, and as large as any seedling of the same age. The original tree is not very thorny. Thorns decrease in size as the tree grows older. Fruit is of excellent quality, somewhat flattened, deep orange red, fine grain and pulp. A good bearer; fruit ripens early, and should be picked before May. Ripens ahead of all other native varieties; is largely cultivated in this State, and is the choicest of all native varieties.

The advantage a good variety (of home origin) has over any foreign

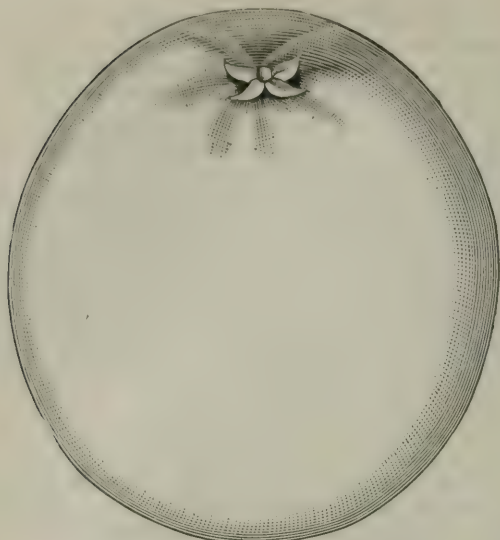


Figure No. 1.

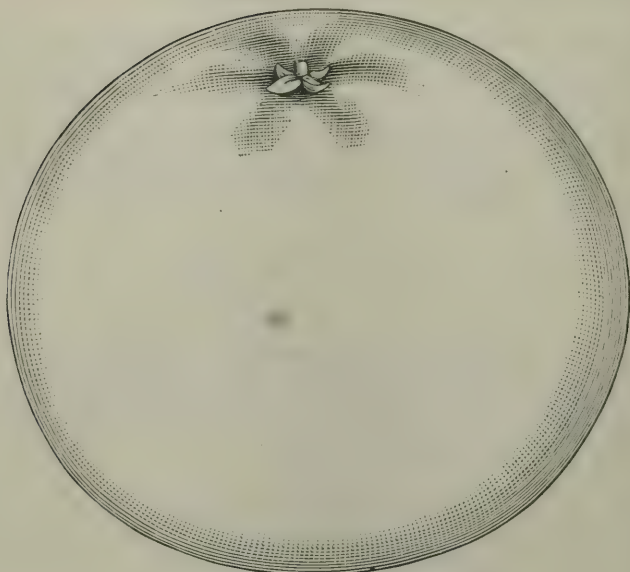


Figure No. 2.

variety is that it is hardy, and can be planted in localities where the temperature gets so low as to prevent foreign varieties from thriving; they will also make a larger tree.

SATSUMA.

Recently many large lots, numbering into many thousand trees of this variety, have been imported into this State from Japan, budded and grafted on the dwarf stock (*Citrus trifoliata*), and pretty much distributed all over

the State where the orange is grown. So well was this orange advertised that the dealers sold all they were able to introduce, and so determined were the people to obtain them that no notice was taken of the dangers of diseases and insect pests, of which due notice was given by the State Inspector of Fruit Pests that he has not found a single lot that had arrived free of infection. Under the present laws they only could be disinfected, but it being an impossibility for any remedy to reach every insect, or every germ of disease, it would be well for some to look in that direction, and possibly they may regret the mistake they made, although the lots I saw looked remarkably well after being removed from the steamer.

This orange has been imported under the name of Unshiu, or Oonshiu, but has been known in Florida and in this State under the name of Satsuma for several years previous to these importations; it has been grown in the San Gabriel Valley for more than five years, and has yet its reputation to make. The specimens I have tasted, direct from Japan, are much finer than those grown in this State, the former being of very fine grain, while the latter is somewhat coarser.

Climatic conditions may account for this, which has proved so with most imported varieties. In answer to many letters, bearing on this variety, I have recommended, and still adhere to it, *i. e.*, budding this variety into sweet seedling California grown stock, as it is better and a more rapid grower than the stock they come budded on, and in this way no risk is taken in not getting the true variety, and the tree most certainly will become larger and more productive. Those that have planted them in orchard form, as they came from Japan, budded on the dwarf Japanese stock, I doubt will ever stand under their shade.

The fruit is of medium size and flattened; of exceedingly fine texture, quite juicy, and nearly seedless; is quite sweet, but lacking the real orange flavor, having a peculiar flavor of its own; it grows very irregular, all sizes being found on the tree. One thing that makes this tree remarkable is its hardiness, having stood unharmed where other varieties were badly damaged by the frosts.

The rinds of most Japanese and Chinese varieties have a peculiar and very unpleasant smell, and on this account they do not come into favor in the market; this variety, however, seems to be free from that peculiarity. In San Gabriel it ripens in November and December.

POMELO.

(Syn. Grape Fruit.)

Bearing on this variety, Professor Van Deman, Chief Pomologist, in his recent (1887) report, says:

Although closely related to the Shaddock, this is a fruit of excellent quality; it ripens mainly after the orange is gone, and is then highly esteemed. Florida produces the best in quality, and almost the entire amount grown. In the northern markets it is becoming popular and will be a very profitable crop to grow.

The flavor is quite peculiar. It is somewhat bitter, but withal, very agreeable, especially after the second or third trial. There is to my mind no more wholesome and refreshing fruit for dessert used during the spring and summer. It should be eaten by cutting the fruit in halves, crosswise, and using a spoon to avoid the bitter taste of the rind. Most varieties are of large size, often five inches or more in diameter, and nearly round, being uniformly a light yellow.

The name "Grape Fruit" was given to it from the fact that the fruits hang so closely along the branches as to crowd each other, and in the distance look like huge clusters of yellow grapes, but the name is otherwise so inappropriate that I have decided to use *Pomelo* instead, which name, however, is less used than the former.

In this State, the fruit has never come into favor, and the tree has only been grown for ornament. In San Gabriel, many trees of various varieties may be seen through the summer with half of their load on the ground, as few care for them except for curiosity, and those that have been sent to market find no sale, and wilt and turn dark on the fruit stands. However, it possibly may be that the varieties grown in Florida are superior to those grown in this State, and it would be wise to experiment in that direction; but most of those grown here have a peculiar odor, and for this reason people care but little for them.

THE BIDWELL'S BAR ORANGE.

Much has been written concerning this tree, but its true history has never been made public until now. I am greatly under obligations to Hon. E. W. Maslin for having aided me in procuring the same, which I append hereto with pleasure:

Letter of E. W. Maslin.

SACRAMENTO, August 4, 1888.

MR. B. M. LELONG:

DEAR SIR: I wrote and got the inclosed letter and photograph from Mr. I. R. Ketchum, the owner of the tree, or rather the manager of the toll-road.

It seems that Mr. Morrill, of Sacramento, planted the seed in 1855; grew the tree, and sold it to Mr. Van Norden in 1859. Van Norden sold out in the road, but Ketchum has had it in charge since that time.

The importance of the tree is that it is the source whence were obtained many thousand buds, and of course thousands of trees in Northern California trace to the Bidwell's Bar orange.

Bidwell's Bar is on the Middle Fork of the Feather River, nine miles from Oroville.

Yours truly,

E. W. MASLIN.

Letter of Morrill to Ketchum.

SACRAMENTO, May 18, 1866.

I. R. KETCHUM, Esq.:

DEAR SIR: I raised and sold, some eight years ago, some orange trees from seed taken from an orange that came from Acapulco, Mexico. I sold two trees to Mr. Van Norden. We then talked about the fruit, and agreed to change buds or fruit. Mine has produced fruit, but no insides to them; all skin.

Mr. Van Norden showed me some of yours which were fine. Will you let me have a few buds?

I am yours, etc.,

J. MORRILL.

Letter of Ketchum to Maslin.

BIDWELL'S BAR, July 31, 1888.

MR. E. W. MASLIN, Sacramento:

DEAR SIR: The Bidwell Bar orange tree was raised from the seed of an orange that came from Acapulco, Mexico, by John Morrill, at Sacramento, California, in 1855. (Mr. Morrill's letter to myself in 1866 is inclosed.)

The tree is fifty inches in circumference six inches above the ground, is twenty-six feet six inches in height, and twenty-four feet through the branches.

Mr. R. T. Van Norden, now real estate agent at 413 Montgomery Street, San Francisco, purchased the tree of Mr. Morrill in March, 1859, and it came here from Sacramento in a ten-inch tub, was five feet high, and had five branches.

The tree has been in my care since it was brought here in 1859. It was first set out under a wall by Mr. Howard Burt, in the south side of the office, but was afterwards removed to its present location. Had it been left in the first location, the freshet of January, 1862, would have carried it off, as it did a number of other fruit trees.

It bore oranges for the first time in 1865; had forty oranges. In 1866 it bore five hundred. In 1882 the crop numbered two thousand two hundred, about seven hundred more than any one year before or since. The regular crop is about eight hundred.

It is evidently of the Los Angeles variety.

Some years many of the oranges are very large. Seven years ago two oranges weighed,

together, two pounds fourteen ounces. Generally round, some few oblate; skin of all the larger oranges is thick; of the smaller, thin.

It takes twelve months to fully mature its fruit. The first of December the fruit is a sulphur color. The first of January, an orange color. After fully coloring the fruit increases in size from one fourth to one third.

I send you a photograph of the tree and bridge, as you have taken an interest in it. Mr. Lelong can get from Mr. Van Norden his account of the origin.

Yours respectfully,

I. R. KETCHUM.

THE LEMON.

VARIETIES TO PLANT.

A marketable lemon should not be large, but of medium size, sweet rind, and strong acid.

The common seedling lemon does not pay to grow; its keeping qualities are very poor; if put to curing, as soon as it leaves the process the majority will be found to be worthless, almost every lemon will show signs of decay. Therefore it cannot be expected that lemons of inferior quality will pay their culture.

LISBON.

Imported from Portugal. Fruit is of medium size, fine grain, sweet rind, and very strong acid; very few seeds. The fruit grows very uniform on the tree, a good keeper, and a prolific bearer. Lemons can be picked from the tree at any time of the year.

The tree is a strong grower, and makes a larger tree than the other varieties described under this head. Is quite thorny, but thorns decrease in size as the tree grows older. A very desirable variety.

VILLA FRANCA.

Imported from Europe. Is of a medium size, considered to be the finest of all lemons grown. This lemon has fruited in Los Angeles for several years in the orchard of J. W. Wolfskill. Fruit oblong, slightly pointed at the blossom end, rind thin, without any trace of bitterness even when green, acid strong, juicy, nearly seedless. Tree thornless, branches spreading and somewhat drooping, foliage sufficiently abundant to prevent the fruit from scorching. This variety has the name of withstanding a lower temperature than other imported varieties.

GENOA.

Imported from Genoa by Don José Rubio, of Los Angeles. Medium size, oval, sweet rind, thornless, and nearly seedless. Tree is of a dwarf habit, a good keeper, one of the best.

ASIATIC.

Imported by J. W. Wolfskill, of Los Angeles. Fruit medium size, oval, thin rind, without any trace of bitterness under the most careful tests. Tree and fruit resemble the Genoa, but a better acid; thornless.

SICILY.

This lemon was about the first cultivated in California. Since then many other varieties have been introduced which are far its superior. However, if put through the proper treatment will produce a good lemon.

EUREKA.

A native of California, originated by C. R. Workman at Los Angeles, from seed imported from Hamburg in 1872, only one seed growing, from which buds were put by him on orange stock. Introduced to the public by T. A. Garey, of Los Angeles. Fruit medium size, sweet rind, a very good keeper, and very popular, more so than any other variety. The drawback it has is that the leaves are inclined to curl, scarce foliage, fruit produced at extremities of branches and liable to get sunburnt; but this is generally avoided by leaving the branches hang low, and pruned as little as possible.

AGNES.

Originated at National City by Mr. Frank A. Kimball. This lemon is of superior quality, medium size, sweet rind, pulp very fine, with strong acid and very few seeds; thorns few, short and blunt; is a rapid grower, but drooping in character; medium dwarf. This lemon has fruited for six years with Mr. Kimball, and has proved itself to be a good keeper and a very desirable variety.

OLIVIA.

Originated by George C. Swan at San Diego. Fruit of medium size, and said to be of excellent quality; strong acid, and a good bearer; thorny.

GARCELON'S KNOBBY.

Originated by G. W. Garcelon at Riverside. The fruit is of medium size; when cured very thin rind, juicy, and the tests have found it to contain more citric acid to its size than other lemons.

CURING THE LEMON.

Clip (stem cut; do not pull) the lemons when nearly fully grown and when beginning to show a faint sign of golden color. If cut too soon, it will injure the flavor and reduce the amount of juice, which is the certain effect if picked before they begin to color; and if they are allowed to remain too long on the tree the rind will become puffy and will not cure so well, or make as good a lemon.

LAYING THEM ON THE GROUND.

As soon as clipped, lay them on the ground under the tree where not a ray of sunshine can fall upon them, as that would make them spotted. It is not necessary to put any covering on them, unless the trees are pruned high. That would allow the sun to strike direct on them. In such a case it is well to place some loose straw over them. Let them lay on the ground a week or ten days, the weather permitting. They should not be handled until they have shriveled enough to allow handling. Then take them in a close room and pile the boxes or baskets and cover them with gunny sacks or blankets; shut the door, and let them remain at least forty-eight hours; then wipe the lemons carefully, for they will be covered with moisture, and put them into boxes, filling them only half full, and be careful not to let a current of air pass through the room. The doors should be shut and the ventilators opened until the lemons are perfectly dry, which will be in three or four days. Then carefully size them, and leave out

all imperfect ones, as it injures the sale of the good fruit. Then wrap them in tissue paper and pack them very tightly in boxes, marking the number of lemons and brand on each box. In picking it is best to use baskets or sacks, and the fruit will not get pricked with the thorns.

OTHER PROCESSES RECOMMENDED.

Mr. A. Scott Chapman, of San Gabriel, has met with very good success in curing lemons. His process is very simple: The fruit is gathered green, just when turning to yellow, and of such a size that, allowing for shrinkage, will pack from two hundred and fifty to three hundred and fifty in a box. The man gathering has his sack suspended across his shoulders, takes hold of the lemon with his left hand, and with his right clips the stem with a clipper close to the calyx of the fruit.

In case he should drop one he is not allowed to pick it up, for that lemon is liable to rot. He carefully places them in his sack, and having half filled the same, places them one by one in a tray. The trays are placed one above another in the shade of the tree (the trays are six inches deep, filled four inches deep with lemons); there they are allowed to remain for one week, the weather permitting. They will then bear the jar of transporting them to the packing house. At the packing house the trays are placed one above another, about six trays high; a layer of old newspapers is placed on the topmost trays, to keep the lemons therein from drying too fast and getting dusty. At the end of another week, if the weather has not been damp, they will be ready for packing, being yielding and leathery to the touch; they will also have turned yellow. Then they are assorted into sizes and packed. Only those of the same size are packed in the boxes by themselves.

Recommended by Dr. O. H. Congar, of Pasadena.

I have had some experience in regard to handling the oranges and lemons, as to their condition of ripeness, and their effect when picked under certain conditions. I speak of the lemon, because I have paid more attention to that than to the orange. It is a well known fact that the lemon in this State requires certain treatment in order to produce a fruit of first quality. I may say, first and foremost, soil has something to do with it, and something in the matter of treating the trees, as to the amount of water the tree is to get, etc. I would speak of the lemon as it is taken from the tree, and as far as I go I speak of the Eureka, Lisbon, Sicily Bud, and the Genoa. Those lemons, under the treatment I have pursued, will produce a lemon that I challenge the world to surpass.

The lemon wants to be slightly colored on the tree before it is picked; it wants to receive from the soil all the properties that will make it perfect. It must be picked at that stage with the best of care, without much handling. I mulch my trees with straw, and lay the lemons immediately under the tree; it matters not whether it is damp or dry. Of course, if it is a dry portion of the year, I leave them there a less time than during a damp season. They will remain under the tree for weeks, if it is a moist atmosphere. I don't place them over two or three inches deep, and they will cure down to a lemon which I will challenge the world to surpass. By this process the skin loses moisture, and becomes soft almost as a glove, but it is hermetically sealed. There is no chance for the oxygen of the air to penetrate that rind, and it is the oxygen of the air, as we all know,

that causes the decay of all fruits. If you will keep out the oxygen from the fruit, it will never decay. Hence the necessity for picking our fruit with a great deal of care. If lemons are handled as I have described, you need have no fear of foreign competition.

Recommended by A. B. Kingsley, of Ontario.

Mr. Kingsley gives the following as his method of curing lemons: Pick the lemons when they are beginning to turn, and of a good size; place them in a raisin tray with sides on until you have it full, just touching each other; then placing another tray over it, bottom side up, not letting the top tray touch the lemons, and so on until you get your lemons all packed, putting one set of trays upon another. This method, if they are kept in a dark place or covered with sacks, will take about three or four weeks to cure. I also tried another method of packing in dry sand, in raisin sweat-boxes, not allowing them to touch each other, and keeping them in a cool, dry place. After keeping them six months, the method proved very successful. As to the variety of lemons, I have the Eureka and the Lisbon, which are both good. I think lemon culture fully as profitable, if not better, than orange.

SULPHURING THE LEMON.

Bleaching the lemon with sulphur fumes was extensively experimented with. It had been claimed that fruit treated in this way would keep an indefinite time, as the sulphurous gas would toughen the skin and dry up the watery particles, and that it would kill the fungoids on the fruit. Lemons treated in this way did not prove thus. As soon as they left the treating rooms they were noticed to be spotted, and by the excessive use of sulphur some would be rendered white, while others would still retain part of their color on one side, while the other would be bleached to an unnatural color. This has been abandoned.

CURING COMMON SEEDLINGS.

Three years ago a grower at San Gabriel, having an orchard of one hundred and fifty large seedling trees, experimented for the purpose of testing their keeping qualities. He went about it in a practical way: The fruit was stem cut with great care, and laid carefully on straw under the trees away from the direct rays of the sun. When they had shriveled enough to allow handling, they were wiped dry and put into boxes, filling them one half full, and put into the packing house. About three weeks after they were repacked, and all decayed lemons found therein (about 50 per cent) thrown away; nothing but apparently sound fruit was packed, and each one carefully wrapped in tissue paper. Out of about one hundred boxes picked only fifty-two were shipped. They were shipped to San Francisco, being on the way four days. Upon arrival it was noticed that many were decaying. In order to be sold they had to compete with well-cured lemons, as the market was well supplied at the time. They had to remain in the warehouse, as buyers would not take them at any price. Only a few boxes were sold. The grower, after waiting patiently for his returns, was surprised on receiving a letter from the dealer, in which he was informed that he was indebted in the sum of 75 cents balance for freight on the lot.

BUDDING THE TREES.

After going through this sad experience, the grower asked my advice in the matter. I recommend that they should be budded into a good marketable variety. The question was then (the trees are very large—buds will not take in the old wood), how will you do it?

HOW IT WAS DONE.

In the early spring, as soon as the trees show signs of growing, I cut the main branches (some as thick as six inches through) within two or three feet to the crotch of the tree—all lower, also several other branches, were allowed to grow. For if all the foliage of the tree is removed, the shock is so great that the tree seldom recovers its vigor. The trunk will sunburn, and in many instances the trees have been lost. Very soon after numerous shoots began to put forth at the end of every limb that was cut; and when about four to six inches, only those intended to remain were left. All others were removed. When these shoots had attained a large enough size, the large branches which had been left were all removed, and the sap forced into the young shoots. The fine branches around the trunk, however, were allowed to remain, to prevent the hot sun through the summer from scorching the bark. The new shoots were then very strong and thrifty, many being two inches in diameter. In the fall they were budded with the Eureka lemon, and the buds allowed to remain dormant through the winter. In the following spring all this brush was removed, and all cuts made were covered with two coats of rubber paint. The dormant buds came out beautifully. Very few of the tops of the shoots were required to be removed to start the buds. One half of the top of the shoot was only removed in order to force them. As soon as the bud was able to support itself the whole top of the shoots was removed to within about eight inches above the bud, and the buds that had started were tied to what had remained of the shoot. The body of the tree was kept clear of all suckers or sprouts. At first the suckering was considerable, as in the warm weather, and after each irrigation, and as the buds were not able to take up the entire sap flowing up a large trunk, it caused the sprouts to come out all over the tree; but when the buds were large enough to shade the trunk this ceased. Those buds are now nearly three years old; are very large. Many lemons are now on them, and the old worthless seedlings are no more, but in their stead a beautiful and thrifty Eureka lemon orchard.

BUDDING INTO LARGE LIMBS OF ORANGE TREES—A NEW METHOD.

Meeting with such difficulty in making buds grow on old wood, led me to carry on a series of experiments, to find, if possible, a way by which buds would grow in old and large limbs; that if this was accomplished, it would do away with having to cut the tops and wait for the new wood to grow, in order to bud into it.

The Method.

The very largest buds were selected, those having a large thorn (Figure No. 3). The bud was cut, leaving into it considerable wood, and at least one inch long, taking from the limb it was cut at least one half of the wood; then with the sharp point of the knife the wood in the bud was gouged out.

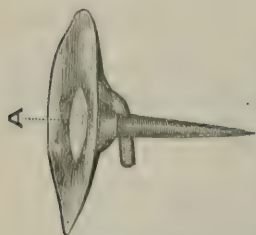


Figure No. 3.

Great care was used not to run the end of the knife into the bark of the bud on either side, the wood being carefully removed, leaving but a very small portion of it, only enough to hold the thorn firmly to the bark of the bud, as shown in Figure No. 3, A. It was then inserted into the tree, and then wound tightly with twine. The end of the thorn should not be cut, as it causes the bud to wilt and die. The result of this experiment was very satisfactory and successful. This was done in spring, summer, and fall; the buds being large and plump, made good growth and not two per cent were lost. This budding is best to be done in the spring, as there is at this time an abundance of sap. The buds will also take better than when inserted later. About an inch of the bark above the bud in a circle can be removed to force the sap into the bud, which will start before the top is cut away. The top is left on the tree to protect it. The twine should be left on the trees as long as possible, because the bark is thicker on a large tree than on a small one; and if the twine is removed too soon the bark will open, caused by the action of the atmosphere, and the bud will be left exposed and will dry. However, great care should be taken not to leave it on too long, as it will cut into the tree. If upon examination it is found that it is working into the bark, it should be loosened, untied, and tied (with the same twine) over again. If this work is done in the summer or fall, the buds must be left to lie dormant through the winter. In early spring the top of the tree is removed, and the bud allowed to grow; but in no case should the entire top be removed. At least one large limb should be left to force the sap into the buds, and all the lower brush on the trunk should be left to protect it from being sunburned. This is, however, removed as soon as the buds are able to shade the trunk and take from it the sap flowing. When these large limbs are removed, the cuts should immediately be painted with at least two coats of the best rubber paint, to protect them from cracking, and so that they may heal and become healthy.

DISEASES OF THE ORANGE AND THE LEMON IN CALIFORNIA—GUM DISEASE.

This disease is first detected close to the ground, and also upon the trunk of the tree, and also on the limbs. It is a yellow gum which forms on the outside of the bark. It is an exudation of the sap of the tree which breaks through the bark and forms a gum. For several years various remedies were tried, but none proved effectual, for how could they; for the disease was not on the outside of the bark, as many did suppose, because they saw the gum running down the trunk. The disease is under the bark, and also will be found to have entered the inner bark, and in bad cases deep into the wood.

Remedy.

Cut away the bark surrounding the place from where the gum is oozing. When this is done, it can be detected where the main affected parts are. Then cut into the wood with a half-moon chisel or gouge, until all the parts from where the gum is oozing are removed; then leave it stand for a couple of days; then, if on examination it is found that the gum is still running, cut away more of the wood, until every particle of the disease is taken out. (Generally, if any is left, yellow streaks are seen in the grain of the wood, which are traces of it.) Then leave it alone for one or two

days. If, on examination the second day, no more gum is seen, or any trace of it whatever, then it is a sign that all of it has been taken out. The wound must then be covered with some substance, so as to not allow the action of the atmosphere from cracking the wood left exposed, as it may injure the tree. If the disease has gone clean around the tree, then it is too far gone, and there is no cure for it. In such cases it is better to remove the tree and place a healthy one in its place.

Covering the Wound.

The simplest of all substances is rubber paint, manufactured by the Pacific Rubber Paint Company, at San Francisco. At least two coats should be given it. This will prevent the wound from cracking, and help it to heal.

Diseased Chips and Scrapings.

They must be put into a can as soon as taken from the tree and burned. They should not be left on the ground, as in irrigating the water will take them to healthy trees, and as the substance is gummy, and as the germ of the disease is not dead, will stick to the bodies of healthy trees, and the germ will grow, and will cause serious trouble.

The Cause of Gum Disease.

Many claim that it is not a disease, but that it is only caused by too much irrigation and neglect of cultivation at the proper time. While this is partly true, it is a disease produced not alone by excessive irrigation, but also by the tree being struck with the hoe in cultivating, or by the cultivator or plow. I have also seen the gum flow from the bark, caused by the hames of the harness of the horse rubbing in cultivating; also where trees had been shot by hunters, and by being hit with rocks by boys while trying to knock oranges off the trees. Therefore it must be seen how much a tree needs to be protected by the cultivator as well as from intruders into the orchard, for often the gum oozes from having a limb broken by persons who, in picking an orange, care little for the tree as long as they get the orange upon it. Other diseases such as DIE BACK, RUST, ROOT, ROT, etc., are not known in California.

Cutting the Tops of Gum-Diseased Trees.

Many have been led to believe that when badly diseased trees begin to show signs of decay, that they can be restored to perfect health by simply removing all the limbs, to force them to make new growth. The trees, of course, put forth, and the new shoots will bear fruit while life still remains in the tree, for generally there are a few healthy roots that keep the trees alive. But such trees will never be of any value, and what fruit they will bear will be very coarse, and much inferior to that once borne by them. They generally remain green for a long time, but such trees cannot come to life again.

PRUNING.

When trees have been allowed to grow at will for several years before they are pruned, most of the inside brush will be found to be dead, and to remove it requires considerable work and skill, for if in removing a branch a hole is made that will allow the hot sun to enter, it will scorch the bark; the fine brush will also die, and diseased trees are sure to be the result. I

have often read articles wherein the writers advocate "that the trees be opened so as to allow plenty of air and sun heat to enter." This advice comes from men having no practical knowledge; men who are ever willing to tell, but who cannot do it themselves. I am sure that no one having an orchard depending upon that alone for a livelihood, would ever follow or give such advice. It is not practical, and should be disregarded.



Figure No. 4.

Figure No. 4 is a good illustration of how a tree is left, or what remains of it, after the brush that protects the trunk and branches is removed. The trunk and inside growth is left exposed to the sun's heat.

I have often seen trees where the bark had been scorched and had dried on the south side of the tree, being the result of removing the brush that protected it.

ADVANTAGE OF LOW TRAINED TREES.

There are several points that should be taken into consideration, *i. e.*: In summer the trees must be irrigated. If trained high the sun heat will bake the ground under the trees before it can be worked; as the cultivator cannot run close to the trunk, it must therefore be worked by hand. When trees are trained low, the shade of the branches keeps the ground moist, and in case of the excessive heat, or scarcity of water through the summer, the trees will not suffer; whereas the heat causes the leaves of high trained trees to curl, and if not watered at the proper time, the growth of the fruit is checked. Low trained trees become better balanced, vigorous, healthy, and more productive than when trained high, also become straighter, and the fruit is much more easily and cheaply gathered.

EXTENDING THE ROOTS OF TREES WHEN PLANTING.

It is a common practice among growers to place the tree in the hole, fill it up with soil, and then tramp it. As the roots are covered with thick mud they will stick together, and if the tree grows it will not do as well as when the roots are extended with care. This is very simple. The hole is half filled with earth, so as to form a mound in the hole, the shovel handle is driven down in the center of the mound, and on being with-



Figure No. 5.

drawn a deep hole is left, sufficiently large and deep enough to admit the taproot of the tree, then the roots are spread over the mound (Figure No. 5), the soil is lightly pressed; heavy tramping is not necessary, as the water settles the dirt and keeps the roots in place. Soon after the trees have been watered, and as soon as the water in the basin has disappeared, the basin is covered with loose soil; this will protect the tree from getting dry and also from leaning over. Trees planted with these precautions make the best growth and become the thriftiest.

PREMIUM PAPER ON CRYSTALLIZED FRUITS.

At the meeting of the Board on July 2, 1888, the following paper was read on "Crystallized Fruits" by J. J. Pratt, of Yuba City, who was awarded the premium of \$20, offered for the same:

The process of preserving fruits in a crystallized or glazed form is attracting considerable attention at the present time. This process, although comparatively new in California, has been extensively operated in southwestern France for years, the United States having been heavy importers, paying fancy prices for product.

The process is quite simple. The theory is to extract the juice from the fruit, and replace it with sugar syrup, which, upon hardening, preserves the fruit from decay, and at the same time retains the natural shape of the fruit. All kinds of fruit are capable of being preserved under this process. Though the method is very simple, there is a certain skill required that is acquired only by practice. The several successive steps in the process are about as follows:

First, the same care in selecting and grading the fruit should be taken as for canning; that is, the fruit should be all of one size, and as near the same ripeness as possible. The exact degree of ripeness is of great importance, which is at that stage when fruit is best for canning. Peaches, pears, etc., are pared and cut in halves, as for canning; plums, cherries, etc., are pitted. The fruit having thus been carefully prepared, is put in a basket, or a bucket with a perforated bottom, and immersed in boiling water. The object of this is to dilute and extract the juice of the fruit. The length of time the fruit is immersed is the most important part of the

process. If left too long, it is overcooked and becomes soft; if not immersed long enough, the juice is not sufficiently extracted, which prevents a perfect absorption of the sugar. ~~It is then placed in earthen pans, and covered with the syrup, where it is left to remain about a week. The sugar enters the fruit and displaces what juice remained after the scalding process.~~

After the fruit has been thus scalded and allowed to cool, it can again be assorted as to softness. The next step is the syrup, which is made of white sugar and water. The softer the fruit the heavier the syrup required. Ordinarily about 70°, Balling's saccharometer, is about the proper weight for the syrup.

The fruit is then placed in earthen pans, and covered with the syrup, where it is left to remain about a week. The sugar enters the fruit and displaces what juice remained after the scalding process.

The fruit now requires careful watching, as fermentation will soon take place, and when this has reached a certain stage the fruit and syrup is heated to a boiling degree, which checks the fermentation. This heating process should be repeated as often as necessary for about six weeks.

The fruit is then taken out of the syrup, and washed in clean water, and is then ready to be either glazed or crystallized, as the operator may wish. If glazed, the fruit is dipped in thick, sugar syrup, and left to harden quickly in open air. If it is to be crystallized, dip in the same kind of syrup, but is made to cool and harden slowly, thus causing the sugar which covers the fruit to crystallize. The fruit is now ready for boxing and shipping. Fruit thus prepared will keep in any climate and stand transportation.

DECIDUOUS FRUITS.

I append hereto the following "extracts from the proceedings of the State Horticultural Society," of the various meetings held in this office during the past year, which I deem of great importance:

PLUMS AND PRUNES.

Essay by LEONARD COATES, Napa

"THE NOMENCLATURE OF PRUNES."

The question of prune nomenclature remains at present unsettled. Pomological works describe some twenty-five distinct varieties. The term "prune," in the English language, signifies those varieties of plums that, when dried, are sweet. "Prune" is merely the French way of spelling "plum."

Here lies the source from which errors have sprung, many varieties of *plums* having been imported to California from Europe, and brought here by foreigners under the French name "prune," while in reality they may not have had the slightest right to the name "prune," viz., a sweet dried fruit, as we understand it here.

For example, take what is commonly called Hungarian prune, and by shippers Gros prune, thereby creating a very erroneous and harmful impression upon the eastern public as to the individuality of a California *prune* in a fresh state, for this Hungarian, so called, is nothing but a large, very showy plum, the other being extremely acid, and, as a dried fruit in any shape, neither profitable nor desirable. The correct name of this fruit, as Mr. Rock has pointed out, is undoubtedly Pond's Seedling.

The prune generally cultivated here as French prune, *Petite d'Agen*—Petty prune—I believe to be synonymous with what Downing describes under the name of *Prune d'Agen*, having also seven French synonyms. There is one other variety, described by Downing, called Burgundy prune, which so nearly resembles it that it is doubtless either a seedling or was grown under different conditions, which caused some modifications in its appearance.

I do not see any reasons for disputing the statements made years ago by Mr. West, of Stockton, after his visit to the prune-growing districts in France. First, that the prune known here as *Petite d'Agen*, is the prune of Agen, the term *Petite* having been locally applied to it in California, owing to its small size in comparison with other fruits; and second, that from time to time seedlings have been originated by the peasants, from which have arisen varieties, or sub-varieties, differing slightly from their parent, and yet being so nearly similar that all have been propagated under the generic name of *Prune d'Agen*.

I wish also to reiterate what I have said on a former occasion, that the French prune is liable to very noticeable outward changes, subject to stock, soil, and the season. I have grafted the same season large trees of apricot, German prune, and almond, with scions of French prune from the same stock, and, in two years, when all were bearing some fruit, the prunes differed very much in size and color. Some were as large as a small Pond's Seedling (Hungarian?), showing that by heavy pruning and thinning the French prune will be as large as those that are graded by the French as their largest select fruit, but which are so large that many have thought, and so stated, that they must have been of another variety.

Mr. Gillet, of Nevada City, is still experimenting with varieties of prunes he is obtaining from France, as I learn from a letter recently received from him.

The expressions Mr. Gillet so often uses are apt to be misleading—"true from the root," "true type," etc.—for there is no doubt whatever in my mind that it is some of the seedlings before alluded to that Mr. Gillet is endeavoring to find.

It is a very common practice among fruitmen in France and Germany to propagate their prune trees by suckers or sprouts from the root. As those produce the same fruit as the tree from which they are taken, of course this tree has never been budded or grafted; or, in other words, is a seedling.

A German in Napa Valley has brought over many of these "sprouts," which bear the same fruit as the trees from which they were taken.

I have found trees in Sonoma and Napa Counties of the French prune, that every year bear larger fruit than the adjoining trees, although stock, soil, age, and other conditions were the same. The inference is, that there are in California prune trees which have been propagated from several of these seedling French stocks, but which are hardly distinct enough to constitute a new variety. Yet, if such be the case, they *should* be distinctly named by the State Horticultural Society, and propagated from as rapidly as possible.

I have samples of another prune which I imported from France under the name *Prunier Datte*, and which is identical with the variety called by Mr. Rock, *Robe de Sergent*. I have both trees growing and fruiting together.

By reference to Downing, it will be seen that *Robe de Sergent* is given as a synonym of *Prune d'Agen*, and further, the significance of the term *Robe de Sergent*, referring to the varied colors in a recruiting Sergeant's uniform, is lost entirely if applied to this fruit, which, as will be seen by

the sample, is nearly round, and of a dark purplish color, never assuming those varied colors so often seen in the *Prune d'Agen*, or French prune.

I am, therefore, entirely at a loss as to the correct nomenclature of this variety. The wood and habit of growth are very similar to those of the French prune, but the fruit is very distinct.

The prune described by Chas. Downing as *Imperiale de Milan* seems to be identical; it is as follows: "Tree vigorous, rather spreading, branches smooth. Fruit rather large, roundish oval. Suture broad, extending two thirds around one side, often enlarged. Skin deep purple, covered with a thick blue bloom. Stalk stout, set in a small cavity. Flesh greenish, juicy, sugary, adheres to the stone. Good. Early September."

At the next meeting I hope to be able to show that there is a marked difference between the Silver prune and Coe's Golden Drop.

THE TYPES OF THE FRENCH PRUNE.

MR. COATES' Second Essay.

Mr. President and Gentlemen: The expression, "Types of the French prune," or of any other fruit, is objectionable because it is misleading.

Systematic botany seeks to simplify matters by dividing into orders and classes all creatures of the vegetable kingdom, and the system of classification now universally adopted is the natural system of Lindley, or variations of it by De Candolle and Jassieu.

Hence we have classes, sub-classes, natural orders, genera, species, varieties, and sub-varieties.

The fruit in question, the "French prune," is a "variety" of the species known as *Prunus domestica*, belonging to the very numerous family or natural order, *Rosaceæ*.

Belonging to this species "*domestica*" are almost all the leading varieties of plums and prunes cultivated in California; but there are several other species of the same genus "*Prunus*," which are indigenous to the United States.

Prunus domestica is a native of Europe, although through accident, or hybridization, some of the finest varieties known, as Washington and Coe's Golden Drop plums, originated in America.

To the ornamental nurseryman or florist is due the fact of the creation of "sub-varieties." As an example, take the Lawson's cypress, or, botanically, *Cupressus lawsoniana*; there is also a *Cupressus lawsoniana variegata alba*, and so on. In horticulture, however, we never want any finer distinction than a "variety," and the varieties are now multiplied almost indefinitely, so that none but an expert can sometimes distinguish them, and he is occasionally nonplussed.

Here, then, are my reasons for objecting to the introduction of another phrase, "type," which is, practically and scientifically, devoid of any meaning or significance whatever.

The late Charles Downing accomplished a great work in classifying and describing the known varieties of fruits cultivated in this country and in Europe; but the most casual observer will notice at once the great number of synonyms tacked on to some of the fruits described. For instance, the variety under discussion is known in different parts of Europe as "*d'Agen*," "*Prune d'Ast*," "*Robe de Sergent*," "*Agen Datte*," "*St. Maurin*," "*Prune de Brignole*," and "*Prune du Roi*." Downing selects the name "*Prune d'Agen*" as correct, which coincides with Mr. W. B. West's conclusions

when in France. "It is," says Mr. West, "undoubtedly the prune of Agen, cultivated there exclusively and in great quantities."

But nowhere do we find the name "Petite" or "French," both of which are of purely Californian origin. It is deplorable that we in California should have done so much to aid the already existing confusion in pomological nomenclature. And we are still at it. Notice the daily dispatches from the East giving account of the fruit sales. The Chicago fruit dealer can sell a box of Hungarian prunes at 60 cents, but if the same is labeled "Gros prunes," he sells it at 95 cents. Neither name is correct; the variety properly is Pond's Seedling.

A cut of the "Prune d'Agen," in "Downing," shows an outline, which, together with the description given, exactly coincides with the fruit raised here as "French" or "Petite" prune, samples of which are now before us.

The question is asked, "Have we the true type of French prune in California?" I answer, positively, "Yes." As an illustration of "types," I show you samples of French prunes from the same stock, grown under different conditions.

[Samples of prunes, green and dried, here shown.]

These prunes, some of which would be, when dried, little more than skin and seed, and some as fine and large as any prune ever seen, are all from the same stock, and the great difference is merely caused by difference in soil and the number of prunes on a tree.

We have, however, another distinct variety of French prune in California, of which I do not know the name. I have failed to get samples for the meeting, but show you a water color sketch, copied from the fruit last year. This is the variety which has been called "Robe de Sergent" in the nurseries here, but as Downing gives "Robe de Sergent" as a synonym of "Prune d'Agen," it cannot be correct. It does not answer to the name "Robe de Sergent," being of a uniform color and more somber looking than d'Agen. Its growth is similar to d'Agen, but coarser and stronger, and the leaves are larger and much more shiny. I obtained some stock direct from France, and some also of the stock imported by John Rock; they proved to be identical. It is rounder than d'Agen, with one side enlarged, and is more decidedly a clingstone, and more juicy.

I also show you a water-color sketch of the "Prune d'Agen," showing its different "types"—using the term advisedly—as I have been at some trouble to get samples from different trees, all raised by me from the same stock, and clearly proving the great variation in size, as well as a marked difference in outline, under different conditions.

The same prune about Napa City, and anywhere in the vicinity of the bay, is of a dull, purplish color; while those raised in the hot, sunny climate of Calistoga, at the upper end of Napa Valley, become a vivid crimson, some being beautifully mottled, readily explaining why the synonym "Robe de Sergent" should be applied to it.

It is no doubt that different *grades* of prunes receive different names *commercially*. "Grading" is a legitimate commercial phrase, while "type" is misleading and useless, as it presumes to create a distinction other than a variety.

It is the prerogative of the California State Horticultural Society to decide these questions of pomological nomenclature; but we cannot control the commercial branding of the different "grades."

I consider the question of the correctness of the variety generally cultivated here as "French prune" clearly proved, but suggest that we follow Downing and call it simply "Prune d'Agen." *Commercially* it will still be "French prune." Also, that the Standing Committee on Nomenclature

be instructed to examine the prune which is being called "Robe de Sergeant," and give its correct name.

I am indebted to Mr. H. L. Gibbs, of Calistoga, for the finest samples of d'Agen prunes.

Since writing the above, I am convinced in my own mind that the prune called here by nurserymen "Robe de Sergeant" is really the "Prune d'Ente" of Bordeaux.

LETTER FROM FELIX GILLET.

The subject to be discussed at the August meeting of the State Horticultural Society being the "Plum and Prune," I would like to make a few remarks and offer some suggestions, and, at the same time, correct some wrong notions in regard to the prune industry, which is assuming such immense proportions in our favored State.

First, I would call the attention of our prune growers to the fact that overconfidence and blowing are more apt to injure than help the development of the prune interest on this coast. "There is no doubt," exclaims exultantly one of our over-enthusiastic prune growers, "of the superiority of California prunes," and we are yet to grow prunes of the *d'Ente* or *d'Agen* variety that would grade twenty-four to thirty, thirty to thirty-five, thirty-five to forty to a pound, as the three first grades of that prune do in the d'Ente district of France. Some others, after comparing their own grown and cured prunes with those French imported ones, as we find them in San Francisco stores packed in fancy boxes of one kilogram (two and one fourth pounds), at the very low price of 75 cents per box, came to the conclusion that theirs beat the best cured French prunes, ignoring the fact that these imported prunes are all of the fourth and fifth grades, or "first grade for exportation."

But on the curing, manipulating, and packing of the prune, as done in France, the ignorance of our people is so manifest that I believe it is rendering our prune growers a service to call their attention to the way the French handle that great product of the southwest of France. The fact is that our fruit growers should employ more care in picking, curing, grading, and packing their prunes, if wishing to clean out the French imported goods from the American market, compete with them abroad—in fact, extend the scope of their exports. Of course, duties on imported prunes, as it is wrongly suggested for raisins, might be raised to such figures as to exclude the importation of prunes altogether from this country. This would compel the consumer of the prune in the United States to purchase from us our prunes in whichever way we would put them on the market, but I do not think this is the right way to help and develop this great industry of the Pacific Coast.

FRENCH PRUNE DRIERS.

Until Mr. Klee, at a recent meeting of the society, read a translation of Mr. Issartier's paper on the preparation of the *Prune d'Ente* in France, as read before the *Concours Regional* of Agen, in May, 1886, almost every one in California had an idea that the French dried their prunes in bread ovens. Better informed people, or those who should be better informed, do or did share in the same delusion. "The fruit grower in France dries his fruit in an oven sufficiently to keep about two weeks without molding," said Mr. Aiken, in an essay on the prune, read before the Fruit Growers' Convention a year ago. Now this is all wrong. It is true that the small fruit grower, the peasant who owns but a few trees, does put his bread oven to good advantage in drying his little crop of prunes; and a bread oven cannot dry more than five hundred kilograms, or about one thousand one hundred pounds of prunes a season, that is, turn out more than the above quantity in dried prunes. So the large growers who turn out as much as seventy thousand pounds of dried prunes (and not half dried, as wrongly stated by Mr. Aiken) have to use driers, and indeed have been using them ever since 1837. At the present time there may be a hundred different patterns of driers in the prune district of the Lot, in France; and it is quite a sight to witness as many as twenty to twenty-four of those various driers competing every year for premiums at the *Concours Regionaux* of the great prune centers of the Lot, such as those of Clairac, Montclar, Villeneuve, Bergerac, etc. A *Concours Regional* in France is pretty much like one of our district fairs, with the exception of the holding of horse races and horse gambling, which is not allowed there; the *Concours Regional* being simply an agricultural and horticultural competing fair, as its very name, *Concours*, implies. Every year the French are improving on their driers, and in the face of the ever-increasing opposition to their great product from other European prune centers and California, they are striving to turn out a finer article still at cheaper prices and under new forms. My last information from the prune district of the Lot, and I am trying to keep myself well posted on anything going on there in regard to that prune business, of such personal interest to me, is that since the invasion of the phylloxera and the destruction of vineyards in those departments comprising that prune district, and the surrounding departments, too, the grapevines have been taken up by the root, and large quantities of prune trees planted in their place. This is bound to create an overproduction, for which a new market is already sought after. My informant writes to me that many large growers propose to handle their crops in the following manner: Three grades are to be made of all the prunes, the largest ones, from twenty-four to fifty prunes to a pound, for which there are special rates, with always a good demand, will be sold in their bulk to the prune merchants; the second

grade, at fifty-five to seventy per pound, are to be packed in fancy pasteboard boxes, with glass covers, and sold at 70 cents per box wholesale, and 5 francs or \$1 retail, the box to be made to contain two and one half kilograms of prunes, or five and one quarter pounds. As to the third grade, or *fretin*, or smallest prune, seventy-five to one hundred and ten a pound, they will be worked up in two ways, viz.: Either sold to distillers to be turned into brandy, which is said to be delicious, and with as fine an aroma as Cognac, or turned out into preserve or *confiture*, which requires as much sugar as pulp to keep, and put in pots or small glass jars of five hundred grams, or one pound and two ounces, to be sold at 10 cents per pot wholesale. The United States, as usual, is the main objective point for those new or overproducts of the French prune grower.

THE APRICOT IN FRANCE.

Though the apricot is foreign to this prune discussion, I would right here, in speaking of the planting of so many prune trees in France, put a flea in the ear of our apricot growers and canners. In the valley of the Rhone, in France, the home of the apricot there, and where the phylloxera has caused such a ruin among vineyards, immense quantities of apricots are planted in the place of the grapes, and "canning" resorted to. Canned apricots from California have already found their way not only to England, but also to France; in the latter country, I suppose, an object of curiosity. Well, the French did smile at the poor quality of the California article; they are going at it now, but using glass instead of tin, and "putting up" only their very best fruit, keeping the smaller and inferior one for confectionery purposes, to make that delicious "apricot paste" which requires such an enormous quantity of apricots every year. I hope that our apricot growers and canners will take the hint, if wishing to extend the scope of their exports and put their goods on foreign markets.

HOW PRUNES SHOULD BE HANDLED.

The *Prune d'Ente* should never be picked from the tree, or shaken down, unless perfectly ripe; and never put to dry before being in a withering condition. This is the great secret for obtaining sweet pulpy prunes with a jet black color, as are the best French dried prunes. But here, I understand that the fruit is often gathered all at once, ripe or not ripe, and cured in that state of unripeness. This method may be expeditious and cheap, but it is certainly wrong. Let our prune growers well remember that the beautiful black color of the French prune, its exquisite flavor, and pulpy condition, is due above all to the complete maturity of the fruit. In regard to the flattening of prunes, which are used on the top of boxes or the sides of glass jars, fingers are no more used for that work. For years the French have been using cylinders coated with a good thickness of India rubber, which do the work so much quicker and nicer. Pressing prunes in boxes and barrels with the feet has also been done away with; a machine named *Pagueuse* does the work now.

As to the packing in pasteboard boxes, zinc canisters, glass jars, and the like, the prunes, just before packing, are put at a temperature of 120° Centigrade, and sealed up tight at once; so packed they will keep years, and may be exported to warm as well as temperate or cold countries.

More than a hundred vessels leave Bordeaux every year loaded with the precious merchandise from the Lot, the chief countries of export being the north of France, Belgium, England, Holland, Germany, Russia, and *more particularly* the United States.

The prune merchants in Agen and Bordeaux have their own way of preserving and packing the prune, which they keep *secret*, and it is very hard, unless paying well for it, to get at any of those secret and personal ways of preserving and packing the prune, without having to cook it as hard as a Sacramento Valley prune.

NAMING OUR PRUNES.

Before concluding my remarks on this prune subject I would like to make a suggestion to our prune growers and shippers; it is simply to call by its name our California grown prune. In fact, why should we call it "French prune?" That is no name at all. In the first place, there are several different families of French prunes. I have myself eight or ten varieties, blue, red, yellow, all colors and shapes, such as *d'Ente*, *St. Catherine*, *Perdigron*, *Dame Aubert*, *Duriman*, etc. I would, therefore, propose that our "Petite prune d'Agen," more commonly known under the name of "French prune," be called "California prune d'Ente," and that our shippers label it so, for it is a true type of the *d'Ente* family, and California grown.

THE APRICOT.

Essay by JUDGE W. C. BLACKWOOD, Haywards.

The apricot is said to be native to Armenia in Asia, and introduced from that country into Western Europe by the Romans. It is on its native stock a long-lived tree. Mr. John Wolfskill, of Winters, told me some years since

that at Santa Fe, New Mexico, there were trees eighty or one hundred years old still vigorous when he knew them, some twenty years since. Cultivated on the peach-root, I am unable to say how long they will last. In an orchard I planted some thirty years ago, there were some apricots on peach-stock. The most of these trees are still there, and seemingly as vigorous as ever.

SOIL AND CLIMATE.

A moderately moist loam is the best for the growth of the apricot. Too much moisture is ruinous. A clay soil is not good. The tree seems to thrive best where it has a moderate exposure to the ocean breezes and genial warmth of temperature; hence the wonderful success which has attended its culture around the bay of San Francisco and coast counties further south. Its cultivation has never been made successful in the Atlantic States, and it does not succeed very well in many of the interior counties in our own State. The climate of the interior seems to be too dry and hot, and if artificial irrigation is resorted to there the gum disease develops, and the fruit, when ripe, is watery and deficient in richness.

When climate and soil are favorable the tree is subject to few diseases. In the vicinity of Haywards, where the tree has been successfully grown now for thirty years or more, no disease has ever developed, and it is singularly free from being attacked by insect pests.

VARIETIES.

The books describe some twenty or more varieties, many of which have been experimented with in this State, and the most of which have been discarded as unprofitable for general market purposes. Of the older varieties cultivated in this State none seem to retain their hold on popular favor except the Moorpark and the Royal. The Hemskirke, the Breda, the Peach, and Du Bois' Early are no longer cultivated to any extent by nurserymen in this State.

Then we have some new varieties to which public attention is occasionally called. The St. Ambroise is a new variety. From what I have seen of it I think it hardly equal to the Royal. There is the Siberian or Russian, favorably spoken of by nurserymen of Kansas. It is about the size of the Breda. Its chief excellence seems to be its hardiness, and it is said to stand as much cold and frost as the peach, and blossoms about the same time. It probably will now become popular in this State. There have been some new varieties originated in this State. Of their claims to popular favor I know nothing and can say nothing.

The Moorpark originated in England. It is an old and highly esteemed variety for its enormous size and excellent flavor. In some portions of the State it is said to be a regular bearer, but in the country around the bay it is an uncertain bearer, producing full crops only once in four or five years. For canning purposes it is objectionable by reason of its ripening on one side first, but for drying it has probably no superior.

The Royal, introduced into this country from France, is for all purposes, perhaps, the best apricot cultivated by our orchardists. It is an immense and a constant bearer, and, when the fruit is properly thinned, it attains a full medium size. It ripens evenly and assumes a rich orange color with a red blush on the side which is exposed to the sun in ripening. It does not commence to decay as soon as the Moorpark—in fact, I have seen it dry on the tree instead of rotting. For canning or shipping long dis-

tances it has no superior, and, when dried, it makes a beautiful light-colored fruit; and, as for flavor, it is among the best.

The Blenheim is another favored variety. It is of a beautiful lemon color when ripe, and in size about the same as the Royal. The skin of the Blenheim is very tender and is easily broken. As for flavor, I think it has no superior. It is valuable for canning or drying. The tree is a vigorous grower, covering itself well with broad leaves, but when young is apt to cast the most of its fruit. When it obtains age it bears well and seldom needs thinning out. There is another variety of apricot, called by some the "Blenheim." This variety bears quite young, is a good apricot; but not as vigorous a grower, nor is the foliage as dense as the first variety I have described. From descriptions found in the book I think it is not a true Blenheim.

In conclusion, I would say California would seem to have a monopoly of the apricot business, although it is grown in some other portions of the United States. When properly dried, it is among the best of our cured fruits, and among the canned varieties it has no superior. The cultivation of the apricot in those portions of the State adapted to its growth will, I think, always be profitable to the orchardist.

DISCUSSION.

A general discussion on the apricot followed the reading of Judge Blackwood's essay.

MR. HATHAWAY, of San Lorenzo, said he had been told by one of the large canners that he regarded the Blenheim as the coming apricot for canning.

MR. COATES, of Napa, exhibited samples of apricots—Royal—of large size, dried in his fruit drier in four hours. Some other parties had dried Royals by the same process in two and a half hours. The market demands bleached fruit, and as long as it does it will have to be supplied. There is a growing prejudice against the use of sulphur in bleaching fruit on account of its destroying the flavor. Fumes of sulphur are injurious unless used with great care. The public will have to be educated to natural-colored fruit. Dealers all demand bleached. The fruit he exhibited had not been bleached through any sulphurous process. Usual time for drying apricots in driers is from eight to twelve hours. He has done it in from two and a half to four and a half. Driers usually do two batches in twenty-four hours. In the sun it takes two days or more.

MR. SHINN: What are the best varieties to be grown in this State? Shall we ship East or dry fruits? All these are proper subjects now for discussion and the subject cannot be exhausted. One variety may be best for canning and another for drying. He had seen dried apricots from Ventura County at the Mechanics' Fair, did not know what variety, but larger than those shown. He was told that the grower had dried one hundred tons; sold it at 25 cents per pound at the wharf. Subject of dried apricots exceedingly interesting. Apricots are selling now at \$30 per ton; if dried can they be sold at 15 cents per pound? We have all the world a market for our canned goods. There are but few countries in the world where the apricots are produced at all—Spain and Portugal the principal countries. Year after year the demand for apricots from the Eastern States increases. As to what section of the State is most fit for their production, it is said the coast counties have a great advantage, and that the interior and southern parts of the State are less suitable for them.

JUDGE BLACKWOOD regards the Moorpark, where it succeeds regularly, as

the best and most profitable apricot grown in the State. It is large, rapidly handled, rich fruit. It always finds a ready market because of its richness. He regarded sulphuring fruit as a damage, but trade demanded bleached fruit. Had talked with a dealer who told him to sulphur fruit twenty minutes. It would not be fit to eat when cooked if done so long. They all want white fruit, but when a man uses bleached fruit once or twice, he won't use it any more. Now I hold that this thing of sulphuring fruit is just adding poison to the fruit according to the length of time you sulphur it. Sulphuric acid is deleterious to health, as every physician knows. Time is coming when this sulphured fruit will be dropped. I am going to dry fruit this year, and am going to sulphur it, but I don't like it. The Royal for all purposes will retain its place as a popular variety. It can be shipped long distances; will hang on the tree for a long time; it will wait some days for you to handle it after it is ripe; is a rich fruit. Blenheim known here by that name does not answer the description of the fruit by that name given in the books. My Blenheims are bright lemon color; skin is easily abraded—has got to be handled carefully, or shows bruise stains. It is good for canning; think it will be good fruit for drying. Is the Moorpark a good bearer?

MR. BLACKWOOD: Bears pretty regularly, it is said, in Ventura County. I have had trees in my orchard fourteen years, and but two crops from the trees. They do not pay for the room they occupy. This year they were very full; had to thin them out.

MR. SHINN: This is very important. People do not care to grow trees that way. Hemskirke is a good bearer. I never heard but a single objection to the Royal, and that is its size. Royals are very small this year. Blenheims are a degree larger. The Blenheim is about one half larger than the Royal.

MR. BLACKWOOD: Thin out the Royal, and it will be larger than the Blenheim.

MR. SHINN: I will suggest to young orchardists to make efforts to grow seedlings, and obtain just the kind of apricot for our use. To obtain seedlings, plant pits of Royals, and see if good qualities cannot be added to it.

MR. TOMPKINS: This thinning of Royals is a very serious objection; it is about as expensive to thin them as to pick them. The Blenheim is larger, and does not need thinning. It is uniformly much larger than the Royal; and, when dried, is better than the Royal. Thinning is a very serious objection.

MR. SHINN: Mr. Barbour, of San José, states that both the Royal and Blenheim, or Shipley, ripen uniformly, ripen freely, etc. I fear the St. Ambroise will be a shy bearer—more shy than the Moorpark.

MR. BLACKWOOD: Mr. Collins had me visit his St. Ambroise orchard, and showed me trees with fruit on. I would not recommend them. They are not as good as, and cannot be compared to, the Royal. They do not bear as well.

THE SHOT-HOLE FUNGUS.

The following letter was read:

CHICO, June 22, 1887.

Nothing would give me more pleasure and profit than to accept your invitation to be present at your meeting, and tell you "what I know about the apricot." But as tons upon tons of fruit will turn from green to ripe this week, it is necessary that some of us stay at home, and push things to save the crop.

The diseases of the apricot are very few, so far as my knowledge goes. Trees do and will die without any apparent reason. They usually leaf out in the spring, set full of fruit; afterward the leaves turn yellow, the fruit prematurely ripens, and the tree is gone. Sometimes this will occur around a defined spot, until one fourth or one half of an acre is left

without a tree. I suppose these are alkaline spots, but why trees will do so very well for two or three years on these same places and then succumb, I am not able to say.

The "shot-hole fungus" is the worst disease on the apricot that I know of. The first I saw of it was four years ago, in an orchard one and a half miles from Rancho Chico orchards. I brought samples to Dr. Harkness, who was visiting General Bidwell at the time. He said it was a fungus of some kind, and thought it was to be occasioned by the very sultry north wind we were having at the time, and which was preceded by cool, damp weather. He was of the opinion that it would not spread to do much damage, but it has continued with us yet. A few weeks after finding the fungus in the orchard spoken of, I found on Rancho Chico two rows of very old Moorpark badly affected. They were right in the course of the wind from the other orchard. Two years ago I cut off all the tops of these two rows, and sprayed with strong soap and sulphur. There is now a good top and a good crop. Some of the fungus is to be seen, but it is not nearly so bad as before.

G. M. GRAY, Rancho Chico.

MR. TOMPKINS: Fruits are not classified enough. One nurseryman will show you one kind and call it Royal; another will have a different name. Even in the best nurseries, vary from a large Royal to large Blenheim. They should be classified. Division of opinion over a peach from Chico last year as an instance.

MR. SHINN: Fruits are in a perfect muddle in this State. The standing committee of State Board of Horticulture three years ago tried to work up this subject, but I expect we will not hear anything more about it. The American Horticultural Society worked many years for it and brought something out of it, but not very much. Any remedies for diseases?

JUDGE BLACKWOOD: Dr. Kimball dusts with quicklime when the fungus is beginning to show itself. It is not deleterious to the fruit.

MR. WICKSON: It is probable that the sulphide whale-oil soap remedies for fungus for pear, apple, etc., would reduce the fungus on the apricot. Applications should be made in the winter time.

PROPAGATION AND PLANTING.

MR. TOMPKINS: What are the best trees to plant—yearlings or two-year old trees?

MR. SHINN: There is a difference of opinion in that matter. Apricots ought to be planted at the age of one year, although many prefer two-year old trees. It seems to me that a tree two years old is better able to bear the shock of rupture and removal than a younger tree. That is my philosophy, but the general opinion of planters is in favor of one-year old trees.

MR. TOMPKINS: What root would you put apricot trees on?

MR. SHINN: Apricot root is good for apricot. I advocate for each tree its own root, all other things being equal. I cannot be moved from that position. There are, however, exceptions to the rule. Situation may make an exception. Some pears may be best grown on quince roots. On certain classes of soils the apricot tree should be on the plum root, because the plum root will live in moister soil than apricot. Will make that exception. On my place there is a row of apricots grafted on plum, more than thirty years ago. The trees are not the size of others on apricot root, nor have they borne as full as those upon apricot or peach root. The apricot does well on the peach. If the land to be planted on is good peach land, put on peach root. One objection is that gophers like apricot root, while the peach root is too bitter for them. Must destroy gophers if they like apricot root.

MR. BLACKWOOD: Gophers work at night; travel at night. Make sure of him and that he is not there. They are hard to kill.

MR. SHINN: As for age of trees, I believe cherry, apple, plum, and pears may be planted at two years, if the trees are not overgrown; they are better able to recover from the shock than yearlings are.

MR. BLACKWOOD: The apricot on the peach gives long life to the peach stock. In my old orchard I planted peach and apricot trees at the same time: the peaches are all gone and the apricots still vigorous.

MR. PERKINS: I have an orchard one half planted with one-year old apricot trees, the other half with dormant buds. They are now five years old and are all the same size. I did the same with the peach, and now the dormant buds are ahead.

MR. TOMPKINS: There is other experience to the same effect. Trees in dormant buds set five years ago were ahead of one-year old trees planted the year before them.

MR. SHINN: I never had good luck in transplanting dormant buds. Sent East for them, they being scarce here, but two thirds died; did not get as good trees as those budded here. They had been carried too far in dormant buds. Do not recommend that method. It will make sprouts very badly. You have to develop that bud, and, unless the sap flows pretty freely, you will not get the bud you want.

THE PEACH.

Essay by GILBERT TOMPKINS, San Leandro.

"THE PEACH—ITS CULTURE AND MARKETING."

The peach does best on its own stock in a light, rich, warm soil, and in a warm climate, moderately free from winds. At time of planting, the tree should not be more than a year old. Some prefer to plant trees in the dormant bud; others to plant seedlings where the trees are to be, and to bud to the varieties wanted in the following year. Authorities differ, as usual.

In fruit growing, as in all other work, everything depends on putting the right thing in the right place. Don't try to raise any kind or variety of fruit that some one else can raise twice as well with the same amount of work. Don't try to raise peaches for market unless your locality, soil, and climate will produce healthy trees, good fruit, and plenty of it. If the fruit has not been tried near you, try it yourself in a small way. Enough men have been kept poor by planting large orchards that never could pay except in the mind of the planter. Don't add yourself to the number.

All this applies not only to the different kinds of fruit, but also to the varieties of each kind. Take the Roseville Cling; it is a success at Suisun and a failure at San Lorenzo, where it curls badly.

As a general rule, the warm interior valleys—Vacaville, Winters, Suisun, Sacramento, Marysville, Fresno, Tulare, among others—will produce peaches profitably. The coast and bay counties will not. While there are many exceptions, this will do to tie to as a general proposition.

There are an enormous number of varieties, many of which are useless. Plant varieties that have a solid commercial value, either for shipping, canning, or drying. Combine all the good qualities you can and see that the chosen varieties do not ripen all at once. Consult your neighbors who are successful in the business and the nearest reliable nurserymen. Do not get rattled if they all give different opinions, but put your judgment to sifting evidence, and see who ship the best fruit and the most of it. Go slow, but do not be a clam. Energy is as necessary as caution; nevertheless, misdirected energy sometimes becomes recklessness.

DISCUSSION.

JAMES SHINN spoke very strongly in favor of the peach in general as a profitable fruit to grow, and thought the essayist had pronounced a little too strongly against the peach in the coast valleys. Admitting that the interior grows the very best, it is not wise therefore for these places nearer the coast, which grow a good peach and do it profitably, to give up the culture. Of course, varieties must be chosen for local adaptations, and there are places near the coast which differ greatly as to their fitness for the peach. His own vicinity at Niles was about the same distance from the bay as Mr. Tompkins' at San Leandro, but he could grow a good peach at Niles; in fact, has known but one failure of the peach in the thirty-one years that he has resided in the district.

WHAT TO PLANT.

Essay by J. J. PRATT, Yuba City.

This is a subject that is foremost in the mind of the writer at all times. Our people are planting trees for the gain therefrom, and not merely to ornament their places and enable them to sell out to boomers. We are here to stay, and wish to reap the fruit from the trees we plant. Then what shall the harvest be? According to the kind planted, so shall be the fruit thereof. If we plant Early Crawford's we must expect to gather Early Crawford's, and if buyers do not want Early Crawford's, we might as well cultivate willows or some ornamental trees.

I do not presume by my own individuality that I am to say what to plant to a class of people who have spent years in the study of horticulture, and most of whom are now constant students of the subject; but it is from the fact that for the past four years the writer has been at that end of the fruit business where the final results are obtained. Have marked the principal varieties of stone fruits in most of the large cities of the United States, and have heard the results both pro and con, and if what has been learned is of value to any one the writer is glad to impart it.

The staple varieties of fruit are four in number: peaches, pears, apricots, and plums. Other varieties, such as cherries, nectarines, etc., and all small fruits, have only a limited demand, and that particularly in home markets. Of the staple varieties, four years ago the demand for apricots was estimated as seven times greater than that for peaches, then the next in demand; but each succeeding year has brought the demand for California peaches near that of apricots, not that the call for apricots is getting less, but that the peach is growing in favor each year, and this season that splendid fruit not only gained the front rank, but passed the demand for apricots.

The peach seems to be the one particularly adapted to our locality. The writer has made repeated tests and examinations of the canned fruits of other parts of the State, and finds that while we are able to produce a No. 1 article of pears, apricots, and plums, there are other sections that produce equally good. In Alameda County the Moorpark apricot matures to perfection, but it is fully a month later in ripening than it is in our locality, which brings it in with peaches and pears, and makes them difficult to handle. But we have a specialty—one that we can and do excel in. No where in the world can the peach be grown to such perfection as here.

VARIETIES.

Now the question is, what is the best peach to plant? First, peaches are divided into four general classes: White Free, White Cling, Yellow Free, and Yellow Cling. The White Free is of no account for any purpose. Some of the White Cling, especially the White Heath, are very nice, and a good many fruit growers are planting them, but they make a mistake, for white peaches are very hard to sell. Yellow peaches, that are not half so large and fine, outsell them two to one. The Yellow Free has always been considered the best until canners overcome the difficulty of handling the cling. There is quite a list of yellow freestone peaches, each having some particular advantage over another. To speak of them separately would consume more time than is possible to spare at present. The Muir seems to have more excellences combined than any other freestone, but even that could not be distinguished by an untrained eye from some other leading varieties when canned, such as the Foster, Susquehanna, Picquet's Late, etc. But of all peaches, and of all fruits, there is nothing to equal the Yellow Cling. It sells on the market where nothing else will, and always brings the best price; will bear more handling, and will stand longer when ripe. When they are canned they retain their shape and color. The syrup always looks clear. In fact, they possess all the excellencies, and it seems strange that planters will continue to plant freestones. Of the Yellow Cling there are also many excellent varieties, each having some peculiarity that makes it better than any other. Under this head come the Tuscan, the Orange (several kinds), Crawford Cling, Lemon Cling (the large kind, the regular Lemon Cling being too small), the California Cling, and others.

TABLE GRAPE CULTURE.

PROFESSOR HILGARD: There is a grape seldom seen in the northern part of the State, but which is raised largely in France—the Malaga. It is rather sweet and tasteless, but has been shipped from France to Chicago and arrived in good condition. Not a large amount will sell well, but to a certain extent it will.

MR. TOMPKINS desired to know how long the eastern grape season lasted.

MR. BUCK said they have a way of keeping their grapes and storing them away so that they keep longer than ours do, in to the winter even.

MR. TOMPKINS desired to know when they marketed them.

MR. BUCK: Beginning at the South, they ripen by the first of September, and in the Lake Erie region and on the Hudson a little later. They have but little time in some localities between a ripe grape and a frost. More grapes are raised around Lake Erie than anywhere else.

The PRESIDENT thought we might adopt some of the ways they use East to keep grapes. They put them in paper bags partly to protect them and partly for the black rot. He used to keep them in that way in the East until Christmas.

MR. TOMPKINS said, speaking of grapes ripening under foliage, they also colored well in paper bags.

PROFESSOR HILGARD spoke of the Cinsaut, a grape lately brought to this State, although the specimens were poor. It is a short-bunched grape and resembles the Malvoise in that it has a decided flavor, but not so decided as to make it like the Muscat. Every one who tries the grape is delighted with it. It is used as a shipping grape in France a good deal; if it cannot

be shipped, it makes good wine. It should be tried more widely. It has been proved that it will not grow well on poor soils; it requires rich adobe soil. It gives one hundred and seventy gallons of must to the ton. Mr. Wheeler, who planted the grape on gravelly soil, found it was not a good bearer, but it is a good bearer on rich adobe soil. Would recommend it for trial.

MR. CANTELOW, of Vacaville, was not acquainted with the grape. He thought the Verdel a large grape, and, if allowed to ripen, a very sweet one. White Tokay is not a marketable grape. It does not take in this market; never tried it for eastern markets. The Cornichon with him is a poor bearer when short-pruned. He never planted it very extensively, and never considered it a very good grape. No variety of grape is better than the Muscat. When asked which grape he preferred for general culture, replied the Muscat. His variety is a little different from those in his neighborhood. He bought cuttings from Mr. Delmas, of San José. Few varieties better than this. He grafted all his grapes from that kind. He thinks it must be the Muscatel. The wood is thin, and grape is a good bearer, pruned either short or long. He has planted it extensively; it is liked both in this market and the eastern markets.

A member spoke in regard to Tiensing grape. It is very sweet; it keeps for four or five months. He had them last for three months in a very dry place. They came packed to us from China.

PROFESSOR HILGARD stated that it was a grape that they had been unable to fruit at Berkeley, but the fruit is described as very long-bunched. He is told that this grape is allowed to run over trellises and trees in its own country. Our grape has never set. It is an odd looking vine. Leaves are full of prickles; no one would take it to be a grapevine. The stem is also full of hairs. It belongs to a different species and genus. We need further information on the subject. We must pay a little more attention to the possibility of growing grapes that will answer for both wine and table like the Cinsaut. Plant so as to have choice between table-grape market and wine-grape market. Several varieties will serve thus and we should have few financial failures if we tried such varieties.

MR. BUCK spoke of grapes being in the eastern market as late as the first of April in good condition. They were probably kept in cold storage of some kind before they were shipped there. They get them very late in the season. Our grapes have better keeping qualities than their grapes have. We could do the same with ours.

MR. COATES desired to know what variety it is that comes from Spain and was kept so long in the eastern market, especially New York, and Boston, and London. It is kept all through the winter. Was it the Malaga?

PROFESSOR HILGARD stated that it was understood to be the Muscat of Alexandria. It is packed in cork-dust, which takes away all the flavor and leaves its own.

MR. COATES remarked that Dr. Strentzel, of Martinez, used carbonized bran. Tules have been used. Grapes have been kept for months at the East, and no reason why they should not be here.

PROFESSOR HILGARD: We do things in such a wholesale manner we have no time to devote to the little industries yet. Grapes must not be touched with the finger if they are to be preserved for any length of time. In Malaga they are picked by laborers who use shears that grasp the stem after picking it off, or allows them to be held by the thumb and finger without touching the berries. We can use all that care, but it is a question as to whether it will pay, as labor is too dear. He had paid 75 cents a pound for Malaga grapes in the East about Christmas time. In regard to

carbonized bran, carbon is a very strong disinfectant and will take away all the flavor of the grape. Sugar-pine sawdust is the least objectionable, as it is almost entirely without flavor, but cork is considered the best. Found some years ago bark that could be used like cork, from the island of Jesso. Our cottonwood bark may answer for this purpose. This is one of the minute industries. We lose millions of limes and lemons every year because we do not make citric acid, and we have no manufactories for preserved lemons, or extracts, etc.

MR. TOMPKINS said bran caked around the stem of the berry and was objectionable.

MR. COATES thought nothing had been said in regard to keeping the grapes alive, which was the most important thing of all. The acreage of bearing grapes is decreasing, particularly in this part of the State. Few vineyards are in as full bearing as formerly in the northern and central parts of the State, on account of the phylloxera. The demand will increase for all fruits if they can be shipped in good condition and we have low rates of freight. What stock can be renewed for table grapes, which make large, coarse wood and overgrow the stock? That is the principal objection to the *Riparia* family. The Tokay is often claimed to be resistant on account of its great vigor. He has seen vineyards of all varieties killed except the Tokay. Can find that almost anywhere. Some in Vaca Valley have even used the Tokay as stock. The *Riparia* root is such a very small-growing stock that some trust to the *Vitis Californica*. The *Rupestris* grows to a nice large stock in a few years, but is very objectionable on account of the suckers.

THE PRESIDENT: Both in number and toughness.

MR. COATES: Mr. Munson wrote me about a new Mexican grape.

MR. KLEE: It is called the Woolly *Riparia*. They think it is a distinct variety. The leaf is woolly. It is growing at the University.

MR. COATES: It is a strong growing variety, more so than the *Riparia*.

THE PRESIDENT: The *Californica* has proved resistant in some parts of the State and non-resistant in others. They have had samples at the University put in holes from which the diseased vines just were extracted, and the vines are alive now and bear abundantly every year. They are on a very heavy, good soil. He is satisfied that the *Californica* should be placed in rather a rich and heavy soil, and then it will resist. There is no reason to suppose that one grape is going to resist everywhere. You use different roots on different soils for orchard fruits; the same with grapes. To my sorrow, I have quite a quantity of *Rupestris*, and have a stand of about one eighth of successful grafts. In *Riparia* about one half, and *Californica* 98½ per cent. It is on rich and somewhat heavy soil; the same as I found *Californica* growing on the hills in Napa and Sonoma Counties. I have no reason to change my opinion on this point. For the foothills, *Californica* would not be a success; other varieties should be used there. Had a conversation with Professor Viala, from Montpellier, France, in regard to resistant vines in France, where they have all kinds known. The *Californica* does not resist there. Upon inquiry, I found the soil was gravelly and rather poor. *Californica* will not resist in such soil. This subject of resistant stocks is a very important study which we have still to perfect.

MR. TOMPKINS: On quite heavy land this *Californica* seems to resist well; is it so with other stocks? Do they resist on better soil?

MR. KLEE gave his observations on Mr. Thurber's place in Pleasant Valley. There are a few vines grafted on *Californica* root now living. All the rest were killed with phylloxera. Mr. Klee thought there was so much

difference in the adaptation of these different varieties. *Rupestris* grows large and vigorous in the Briggs vineyard.

THE PRESIDENT thought *Rupestris* grows well only in light soils, but would not be successful in as many soils as *Riparia*; that the *Aestivalis* grows in any upland and lowland, while the *Riparia* grows naturally on the lake bottoms and the *Rupestris* grows on the hill soils; no one vine will resist everywhere.

MR. COATES desired to know about the parasites in vines.

PROFESSOR HILGARD thought a great many suggestions were needed yet to teach us what to do about resistant stocks.

MR. RIXFORD said he had been told by Mr. Wheeler, of Vaca Valley, that they have been grafting Tokay grapes on *Californica* to get better fruit.

MR. BUCK: In grafting on any of these strong-growing grapes, you will find that the graft will root for itself unless you keep cutting off the roots.

THE PRESIDENT: Graft on the surface; pull up the earth around it, and then afterward pull it away. *Rupestris* or *Riparia* especially. I do not believe in grafting underground.

MR. KLEE said he had about an acre of vines grafted on the *Californica*. They made a very strong growth, and gave no trouble whatever. In case of trouble they would have to be grafted above the ground. Nurserymen should take hold of this matter and have vines already grafted. If they had encouragement enough they might go into this business. They do that way in France. Graft them in the nurseries.

MR. CANTELOW had a large Mission vine on a trellis and wanted to change it. Put a number of buds into the canes of the previous year, and every one grew. He puts away cuttings in a cool place, waits until the sap begins to come up in the vine, and then puts the buds in by common budding as with fruit trees. He put in quite a number and every one lived.

PROFESSOR HILGARD: Do you wait until the buds begin to swell on the vine?

MR. CANTELOW: I put in the buds just as soon as the bark will slip, and before the sap runs too strong. You cannot do it in summer time. I use no precautions, and simply tie in the buds with string. I think a vineyard could be changed over in that way without any trouble at all. Never heard of it being tried before successfully. In lifting the bark at the right time you will find it will slip as easily as on a peach tree.

FRUIT DRYING.

CAPT. W. M. BRAMHALL delivered an extempore address, of which the following is a synopsis:

The sixty million people of the United States consume about two hundred millions pounds annually of imported and California dried fruits, of which California supplies about one eighth. The disposal of the California fruit crop rests more upon dried fruit than upon any other form of use. The canneries use something less than twenty thousand tons annually. The shipments of fresh fruit aggregate not over twenty thousand tons, while to make the twenty-six million pounds of dried fruit of the 1887 crop, some fifty-two thousand tons of fresh fruit were required.

The readiness with which the leading varieties of California dried fruit are absorbed by the markets of the United States, all being consumed

yearly in face of steady increase of quantity, proves that production has not yet overtaken consumption, and with increasing population we need have no fear of over-production of certain varieties during the lifetime of persons now living, if ever.

The leading factors in the popularity of California dried fruits are excellence of quality, greater cleanness than in foreign goods, and generally honest packing. The element of quality shows conspicuously in California apricots, prunes, and raisins; the two latter ranking with the best imported, grade for grade, and in some instances commanding a preference over the imported. Particularizing the varieties:

Apples will probably always be restricted to local coast consumption. High freights to the East, cheaper labor and fuel there than here, and a sufficient home supply of apples there of a character better adapted to drying, will shut us out from eastern trade, except in the rare years of short crop there and full crop here.

Apricots being practically a California monopoly of production, will always sell in the East and to any extent of production, the quantity and state of general fruit market regulating the price. The California crop of dried apricots of 1887 was over three million pounds, against about five hundred thousand pounds in 1886, and yet the crop went easily into consumption. The prices for 1887 crop were high, that year being one of a short fruit crop and general high prices in the East. The crop of 1888 is estimated at considerably less volume than that of 1887, but in view of a large dried fruit crop in the East, the market for apricots opens at somewhat lower prices than that of last year.

THE USE OF SULPHUR.

The popularity of the dried apricot, while maintained by its rare flavor, has been primarily established by the beautifully attractive appearance of the fruit produced by the sulphuring process. "Sulphur bleaching" is a misnomer, the effect of sulphur fumes being not to bleach or create a color or shade, but simply to *fix* the natural color. Fruit dried wholly in a dark evaporator, whether sulphured or not, is more or less bleached or changed in color, but this is the result of exclusion of the light, and not of the action of sulphur.

Over-sulphuring, while producing beautiful appearance, is injurious to the taste of fruit, though no instance is recorded in medical or other records of any injury, fatal or otherwise, to health from eating over-sulphured fruit. The offensive taste probably prevents its being eaten in quantities sufficient to injure health. But the sale of fruit is hurt by the over-sulphured article, and great care is needful to avoid this error in treatment. There is no occasion to over-sulphur, as is shown by the fine effects produced by so many of our driers, who use the process without any deleterious effects to either the appearance or flavor of the fruit. An allowance of one heaping tablespoonful of powdered sulphur to every fifty cubic feet of sulphur-box space, completely burned, with ventilating holes at top of chest to carry off the fumes, and an exposure of the fruit for twenty or thirty minutes to the fumes according to ripeness, will "bleach" apricots perfectly, not taking away the natural flavor nor adding a permanent sulphurous smell or taste. The greener the fruit, the longer exposure necessary to fix the color. Very ripe fruit, at about the "runny" stage, is often restored to a perfectly rich color with even less than twenty minutes sulphuring.

What the market thinks of sulphured versus unsulphured apricots, is shown by prices on the street to-day. Sulphured fruit is in demand and

selling at 15½ cents for fancy, bright, large, fleshy apricots; down to 10 cents for small or badly sulphured and badly graded fruit, while unsulphured is not inquired for at all, and is offered at 7 to 8 cents without takers.

Dealers are so close to consumers that the popular taste is almost immediately reflected in the wholesale buyers' demands. If the taste of consumers in the East is condemning *all* sulphured apricots, the fact is not yet known to buyers. We can change our processes when necessary, but it does not seem prudential to reduce our selling prices one third to one half unless buyers force this loss upon us. My opinion is that sulphured fruit will hold the field, especially after all driers learn the loss which will eventually come by over-sulphuring.

OTHER FRUITS.

Berries, for the same reasons as those applying to dried apples, will probably always remain an article of local trade only.

Currants.—The dried currants of trade are not currants, but small grapes of the Corinth variety, made chiefly in Greece. The importations into the United States during the past year were twenty-nine million pounds. Not much attention has been given to growing them in California, but they will do well wherever the Sultana grape thrives. If the duty of 1 cent per pound be not disturbed, California might, in a few years, supply the United States with currants, and at a living profit, based upon average market price of 5½ cents per pound in large lots, at first hands over East.

Figs also have not yet been largely produced in California of the kind known as the Smyrna fig of commerce. After many experiments, the true variety seems now to have been discovered and the quality of the dried White Adriatic made at several different places in California compares most favorably with the average imported Smyrna fig. The 2 cents per pound duty upon figs is a factor of moment in encouraging and establishing the production of figs in this State.

DRIED GRAPES.

Grapes, apart from raisins proper, which the dictum of trade permits only in application to Muscats and Sultanas, are being introduced into eastern trade, and are received with great favor. The Mission, Black Malvoisie, and Feher Szagos varieties have for some years sold freely as dried grapes, and last year a quantity of wine grapes, chiefly Zinfandels, found ready market at prices better than their correlatives in the wine-grape market, and are sought for again this year. Preparations to dry every kind of wine grape are in progress this season, and a large output of them is expected. The consumption in the East of cheap "cooking raisins" is immense, and dealers have discovered that while the imported Valencia raisin is a very bad summer-keeper, the California article is a perfect keeper. Heavy losses accrue to holders of Valencias in some years from candying and rotting in the box, but Californias, as a rule, are so much better cured that they are safe to carry through into the second season.

Another possible outlet for dried grapes of the wine-making varieties may be found in France, into which country immense importations of foreign dried grapes are made for purpose of making into wine, and supplementing their own crops so seriously shortened by phylloxera. Dried Corinth grapes are quoted in French seaport cities at about the equivalent to 5 cents United States currency a pound. The inward duty is one half

cent per pound, and other items of sea freight, insurance, interest, and commissions would, I learn, amount to about 1 cent a pound more. Some correspondence with French importers is in progress, and the experiment of shipment of dried California wine grapes will probably be made this season. If this trade can be opened to us we need have no fear of overproduction of wine grapes for generations to come, if ever.

Nectarines are not as yet a popular fruit in the East, but I have faith in their future when sold at reasonable prices. They have been treated heretofore as curiosities and held too high both here and in the East.

Peaches are and will continue of heavy sale at home and East. I believe in the so called "lye-peeling process," which, however, is evidently little understood and generally badly practiced. The common faults are to use too strong a lye, to keep the fruit too long in the lye, and not properly rinsing after. One pound of concentrated lye in twenty gallons of boiling water, an immersion of two seconds or more according to the toughness of skin, *rinsing thoroughly in running water*, then light sulphuring and quick spreading in the sun, will make beautiful fruit, which will bring the price of hand-peeled evaporated peaches. The proof is that certain parties in this State have been doing it for years, and wherever the process has failed it has been from one or more of the causes I mention. Properly speaking, the process should be called "lye-thinning" and not lye-peeling, but the latter name has been adopted and will I suppose stick.

Pears are not popular as dried fruit, but ought to be. Well dried, properly "hard ripe" Bartlett pears, in thin slices, properly soaked and cooked, would be a revelation to those who despise the fruit as they generally get it served.

Plums are another puzzle. There is nothing produced in the East like our California dried pitted plums, and plenty of people like them; but when they are plenty we get nothing for them, and the price is high only when there are few or none. Within the past ten years I have known the price to range in the Chicago market from 4 to 20 cents per pound, and always in the wrong way for us. The good demand East for fresh plums seems our only hope for escaping the necessity of cutting back 90 per cent of our plum trees.

Prunes of California production are assuming importance, more from their superior quality than for the magnitude of our crop. In the year 1887 the importations of foreign prunes into the United States were over ninety million pounds. The California crop of that year was some three million pounds. Of the foreign imported, fully 90 per cent are the common dirty Turkish prunes, from the Danubian countries, the price of which, even with a one-cent per pound duty, ranges somewhere about 4 cents per pound at New York. California prunes thus far have competed only with the imported French. Little by little, as our driers grew in knowledge and skill, the value of the California prune has crept up, until now, except in the high and fancy grades, ours sell at equal prices, size for size, with the imported, and choice lots of Californias sometimes command a preference and a higher price. The imported French prune is really a cooked article, either by being dried in a close heated oven, or steam-cooked in cylinders, while the California prune is simply dried as a rule. A few are being treated here as in France, and very high prices are got for them. The California prune is a better keeper than the imported French.

Quinces are not worth drying.

Raisins of California make are slowly but surely driving out the Spanish. Until California came into the field the Spanish raisin had the market of the world. The superior cleanness and the perfect keeping qualities of the

California article are steadily making headway against the imported, and if Congress will let the duty alone, we will, in a few years, almost wholly supply the United States market, even with Spanish labor and sea freights at one quarter of the same elements of cost in making and marketing the Californias.

Summing up, I perceive that, with a population of sixty million in the United States, California now furnishes but twenty-six million pounds of her dried fruit to their use, but I predict that our production will steadily follow the growth of population, and that it will not overtake it until the population has reached one hundred million, when we shall be supplying them with one hundred and fifty million pounds per annum of better, cleaner, and cheaper dried fruit than they ever had.

ACKNOWLEDGMENTS.

It affords me great pleasure to acknowledge with gratitude the valuable services rendered to this Department by Mr. Alexander Craw and Mr. J. W. Wolfskill, of Los Angeles; Hon. H. E. Van Deman, Chief Pomologist, Washington, D. C.; Professor E. W. Hilgard and Professor E. J. Wickson, University of California, Berkeley; Mr. A. T. Hatch, Suisun; Colonel J. R. Dobbins, San Gabriel; Mr. Frank A. Kimball, National City; Mr. W. H. Robinson, Stockton; Mr. H. P. Stabler, Yuba City; Mr. G. M. Gray, Chico; Professor H. C. Ford, Santa Barbara; Mr. N. W. Blanchard, Santa Paula; Mr. I. H. Thomas, Visalia; Hon. E. W. Maslin, Sacramento; Mr. Leonard Coates, Napa City; Mr. Felix Gillet, Nevada City; Mr. H. A. Brainard, San José; Mr. James Shinn, Niles; Hon. W. H. Aiken, Wrights; and many others throughout the State. It is highly gratifying to receive at their hands such hearty coöperation in this most important work now before us, laying aside all sectional feeling, and with the recognition that we are all citizens of California, identified in the common interests, conspiring together for the common good, each striving to promote the honor and welfare of the whole State.

Respectfully submitted.

B. M. LELONG,
Secretary.

PROCEEDINGS

OF THE

EIGHTH STATE FRUIT GROWERS' CONVENTION.

SANTA ROSA, November 8, 1887.

Pursuant to notice, issued by the State Board of Horticulture, the fruit growers of this State assembled at the Athenæum, in Santa Rosa, on Tuesday, November 8, 1887.

HON. ELLWOOD COOPER, President of the Board, opened the proceedings of the Convention by delivering the following address:

PRESIDENT'S ADDRESS.

LADIES AND GENTLEMEN: This will be the Eighth Fruit Growers' Convention, and the fourth held under the auspices of the State Board of Horticulture.

In calling the Convention to order, I have little more to say than to review somewhat the work that has been done, and call your attention to important questions which still require our careful consideration. At the three previous Conventions, of which our Board assumed the expenses and directed to a certain extent the exercises, we presented a carefully prepared programme. These programmes were conformed to systematically, thereby economizing time and enabling us to more intelligently discuss the various questions coming before the Conventions. We have no prepared programme for this Convention, as it was suggested at our last, held at Riverside, that it be left for this Convention to prepare.

After many delays over which we had no control, we succeeded in the completion of our last biennial report. It may not be out of place to state that I consider it the most important work of the kind ever published. To the California fruit grower it contains information about almost every kind of fruit, insects, remedies, and a diversity of opinions on some important points, which tends to strengthen our investigations and observations and prevent any serious mistakes. Said report contains the transactions of the three Conventions—one held in Los Angeles, November, 1885; one in Sacramento, November, 1886; and one in Riverside in April of this year—also valuable information by our officers and members.

I recommend to you this report, which has been published for the benefit of fruit growers, and which is to be had at our office, 220 Sutter Street, San Francisco.

In the report of the College of Agriculture, by Professor Hilgard, of the University of California, which I have perused with great interest, the Professor urges the importance of a State Entomologist, with his headquarters at the University. We have at previous Conventions passed resolutions asking an appropriation for this object, and I trust will continue asking until we succeed.

I must call your attention to remarks made in said report, on page 15, where the Professor makes use of the following language:

"A State Board of Horticulture and its executive officer are perpetually

working in the dark, for want of the fundamental condition of knowing what it is they are really dealing with. When an officer of the State is heard in the nineteenth century gravely propounding the doctrine that certain insect pests originate by spontaneous generation," etc.

The language following the foregoing would indicate that I was the authority for the statement. It does myself and our Board injustice. This has been published in various newspapers throughout the State, and has done irreparable injury, because a correction of the statement could not possibly reach the same readers.

Whether or not new creations are constantly being made would not be profitable for us to discuss at this time, as the creations already made baffle our united efforts to keep in check. To those interested in olive growing I recommend, in addition to our last biennial report, the report of the College of Agriculture, 1887, pages 109 to 115, inclusive.

In a review of the speech of Senator Hiscock, at the Lyons Fair, State of New York, I was particularly impressed with one or two statements made: "That in twenty years agricultural implements have displaced 50 per cent of the muscular labor; the productions are more than doubled; and that, notwithstanding this displacement of manual labor, wages have increased 60 per cent; that the necessities of life, as well as the luxuries of civilization, are at their lowest prices in our history; that the first care of the government must be protection from internal anarchy and assaults from without, of whatever conduces to national prosperity; the education and happiness of the people should be encouraged; diversity of labor, so that the land will not be overburdened with workers; the protection of diversified industries, of labor, production, interchange of products, home markets, and home consumption—all essential to the maintenance of this great prosperity."

The tilling of the land and the gathering of the crops is attended with unnecessary difficulties, arising from inefficient and unwilling workers. This condition is caused largely by the political controversies of unscrupulous aspirants, who appeal and pander to the worst instincts of the unwilling and uneducated worker. If our Representatives, or law-makers, were imbued with the honest exertions of the fruit growers and farmers, a different state of things would certainly exist.

The interests of the poorest laborer and largest fruit grower are harmonious. One cannot have permanent prosperity without the other. We should unite in our political action, to bring about harmony between labor and capital. There should be no idlers. If all worked, and worked faithfully, this feeling of antagonism would soon pass away. We should make the wage worker feel that we have an interest in him, in his family, and every effort on our part for his best interests and happiness. Until we do this there cannot be much improvement.

Politicians who appeal to idlers and whisky to gain votes should be left at home; also those not self-supporting. Let us select from amongst ourselves representatives, and no matter how unwilling the task might be it would be a duty we owe to our fellow citizens to succumb. The difficulties that menace us by reason of antagonistic labor we should correct, and if each individual employer would take upon himself the determination to convince those engaged in his service that each have one common interest, and make them feel by practicable interestedness that we were willing to serve them in every way that would lead to their highest possible happiness, so far as the farming and fruit industries are concerned, and the laborers engaged in these pursuits, there would be a united feeling.

There never was a time when the horticultural interests in this State

were so prosperous as now. We have had large fruit crops and generally sold at high prices. There has been less waste. Our people have learned how to take care of fruit, and really we have much to be thankful for. Freight rates and facilities for shipping have been granted by railroads, so that our markets have been extended and losses obviated. Our markets are increasing everywhere east, and if we continue to supply good, sound, well-prepared fruit, at reasonable prices, will still increase and insure our prosperity. In view of these various suggestions, the questions that are most prominent for discussion at this Convention are as follows: Insect Pests, Marketing the Fruit, Cold Storage.

It is not only necessary to know how to grow, and where to grow, but when grown how it shall reach the consumers. How to grow comprises the general knowledge of tilling the ground, planting, care of plants, and pruning. What to grow—the right varieties. Where to grow—the adaptability of certain localities for certain special varieties or kinds of fruit. This knowledge, with the further knowledge of how to keep insect pests in subjection, will not secure our prosperity without a united effort to place the fruit in the homes of the consumers at cheap prices. Our consumers are beyond the Sierras, from Nova Scotia to Puget Sound. A combined effort on our part to properly distribute this fruit is a necessary part to insure financial success. The fruit unions have done much toward solving this problem, and deserve great credit. The packages, and care in packing, must be controlled. Bad handling injures all. If cold storage will obviate fast railroad time, a great gain will be the result.

Regarding insect pests, we have made substantial progress. A greater interest has been taken, and many remedies have been energetically applied. This is the first step toward success. Fruit growers are informing themselves, and experimenting intelligently. There has been much progress made in experimenting with gas in Los Angeles County, and I hope the Convention will have the benefit of these experiments from the experimenters who are present.

Forest culture, in relation to fruit growing, should also have your attention. I refer you to the very able and interesting essay by Abbot Kinney, pages 118 to 127 of the biennial report.

It is a question whether fruit growing in many parts of the State can be made a success without planting forest trees to protect them.

All these matters are submitted for your consideration.

THE PRESIDENT then announced the Order of Business, and declared nominations for Vice-Presidents in order.

On motion, Mr. P. W. Butler, of Penryn, and Colonel Mark L. McDonald, of Santa Rosa, were unanimously elected Vice-Presidents, and Professor E. J. Wickson, of Berkeley, Assistant Secretary.

COMMITTEE ON PROGRAMME.

Messrs. S. J. Stabler, of Yuba City, A. T. Hatch, of Suisun, Gilbert Tompkins, of Alameda, E. W. Woolsey, of Santa Rosa, and Mr. Shepard, of Sonoma, were elected a committee on programme.

The Convention then adjourned to meet in the evening at half-past seven o'clock.

EVENING SESSION.

The Convention assembled at half-past seven o'clock on the evening of the eighth, to listen to the address of welcome. The citizens had selected

Dr. A. S. White, of Santa Rosa, to speak in their behalf words of welcome to those assembled.

PRESIDENT COOPER: Ladies and gentlemen, it affords me great pleasure to introduce to you Dr. A. S. White, who will now address you.

ADDRESS OF WELCOME.

DR. WHITE: Mr. President, ladies and gentlemen, members of the State Board of Horticulture, and of the Fruit Growers' Convention of California.

At our annual meeting one year ago, the County Association of Fruit Growers of Sonoma united with the Board of Trade of this city in a most pressing invitation that you should hold your next meeting in this place, and now that you have accepted that invitation and have added to the joy of our hearts by appearing here in such strength, it becomes us to set before you somewhat of the section of country in which we live, of its resources, capabilities, and present development.

The County of Sonoma has about twenty miles frontage upon an arm of the Bay of San Francisco, about sixty miles frontage upon the Pacific Ocean, with a bay at Bodega, and a number of shipping points along the coast. From these points, vessels laden with the lumber made in our redwoods have been shipped to distant ports, not only of our own country, but to South America, to Australia, and to the islands of the sea. It is a fact in history, that the very first sawmill ever erected in California was erected at Bodega Bay, and the very first shipment of lumber ever made to distant points was sent from that bay at an early day; since then that region of country has become very noted for its great fertility of soil, and for a time it stood unrivaled by any section of the coast in the production of potatoes, not only in regard to quantity, but in regard to quality; and after years of success in this department, as there was no competition to stimulate the inhabitants, they turned their potato fields into barley fields and into pastures for their dairies, and now much of the gilt-edged butter so highly prized, comes from that favored region. It is a fact, sir, that the Coast Range of mountains, within about fifteen miles of this bay, is depressed into mere round hills; between these hills are a number of exceedingly fertile valleys, well watered by springs and by living streams, many of them abounding in trout. This whole region is susceptible of the very highest state of cultivation, and I assert that the soil stands unrivaled by the soil in almost any section of our State. A little south of due east, sir, of where you are now sitting, grew the first redwood timber, and from that northerly it extended to the utmost limit of our county, and on still northward into Oregon. Between this region of redwood and the ocean there is a space of from one to three miles in width, extending the whole length of the county, susceptible of the very highest cultivation. It is used principally for pasturage, and there are some of the finest dairies of our State in that neighborhood; then to the eastward of the redwood section, to which I have alluded, comes in Blucher Valley, and a little north of that Green Valley, the very natural home of the berry of every variety. We have seen our streets crowded here with the blackberry and the raspberry and almost every kind of berry that we can name that will grow in this climate, from that region; but they are not confined to berries alone, it is the native home of the peach, the apricot, the plum, the pear, of the apple, in fact, all deciduous fruits flourish and grow to perfection in those sections; but, sir, we claim that in that redwood forest where the trees stand to-night in all their beauty and majesty, lifting their heads hundreds of feet

above the roots, there is untold wealth, and as we shall see further on that forest is one of our principal sources of revenue as a county.

It is difficult to give the full estimate of the lumber capable of being produced in that section. Then, sir, all through this great forest there are beautiful valleys, that just so soon as this timber is exhausted, will furnish an inexhaustible supply of pasturage, and also an inexhaustible supply of all that can be cultivated in this climate. So that it is by no means to become a waste, in case this forest is cut away. Then, sir, following eastward and northward, we have one of the most beautiful little valleys upon which the eye of man ever rested. I refer to the valley of the Dry Creek, and I am most happy to be able to point you to some of the grapes that arrived this evening from that region of country, bearing the label of Mr. Chrystal. I call attention to these specimens of the product of that country, because I think they will compare favorably with the grapes from any other part of the coast, if they are not superior. Were it not for the fact that I am aware that Sonoma, Rincon, and other small valleys, little gems within themselves, each possess their peculiar advantages, I would say that Dry Creek Valley stands unequaled in any part of our county or State. Then, sir, when we turn a little eastward from the section I have described, there opens out the great valley, a part of which you gentlemen have seen in your passage to our city, called the Petaluma Valley, the Santa Rosa Valley, the Healdsburg Valley, the Cloverdale Valley, it is all the same; there is but one valley in the world, so far as I know, that surpasses it, or equals it in attractiveness. I refer to the Vale of Cashmere, celebrated by poets and travelers; but I maintain, sir, that although the Vale of Cashmere may be longer and broader, still it stands under the shadow of the Himalaya Mountains, that reach their heads into the regions of eternal snow, and from these heights come down chilling winds and blasts, such as we have no conception of here. Hence, I maintain that the climate, as well as the fertility of the soil, excels even the far-famed Vale of Cashmere. It is a fact that there they only produce the wool or mohair from the cashmere goat, which is woven into the most expensive shawls, while here, every fruit, every product of the climate, and of the soil, grow in the greatest possible perfection, and were we disposed, on these hills we could have the cashmere goat, and who will say that American ingenuity cannot weave as fine shawls, as costly a fabric, as they can in the Vale of Cashmere.

Then eastward of this valley we have the Sonoma Valley, exquisite and beautiful, and fertile as a garden. Then is the Los Guillicos; and then comes the Rincon Valley, Bennet Valley, Alexander's Valley, and, sir, I know not how many other little valleys, all neatly and romantically nestled in the bosoms of these mountains, to the east of it, and each one exceedingly fertile and productive; further on, we have the higher region of mountains, covered with a strong growth of black oak, the very best fuel that we have; and then, in addition to these forests, we have evidence that these hills and mountains were once covered with a great powerful growth of redwood, and through some process of nature these forests have become petrified beneath the soil, and hence we have the petrified forests, as though we had not forests enough. And, sir, in this region we have a great many medicinal springs; I know not how many; we can scarcely number them. You can scarcely drive a half day on many of these mountain roads, without encountering some spring celebrated for its curative powers; and there are a great many advantages in these hills that it is not perhaps wise to attempt to describe on this occasion.

There is one point to which I have not yet alluded: that, throughout all

this region of country, we have no need of irrigation; nature has given us cool, clear springs of water from the mountains, and brooks filled with trout in every direction, and a river that enters a little eastward of the center and flows southward half way through the town, then westward into the ocean, watering all that region of country, so that we have a county that abounds in all that is essential for its growth.

Now, sir, this county has about one million of acres of land; two hundred and fifty thousand acres are adapted to the growth of vines and deciduous fruits of all kinds; one hundred thousand acres are adapted to the production of the olive, and about one hundred thousand acres are adapted to the growth of the chestnut. Why, sir, you have only to ascend this neighboring hill to see the olive and the chestnut flourishing on the verge of the hill, where under the surface you would hardly think there was soil enough for a tree to get footing, and yet there in a little while the olive will yield its fullness and the chestnut its abundance of fruit. There are twenty thousand acres, as I am credibly informed, in vines now; last year's product was two hundred and sixty thousand tons of grapes; the output of wine was over two million of gallons; and I am sure that this year it will reach three million of gallons. As we have but forty thousand inhabitants in this county, that is seventy-five gallons to every man, to every woman, to every child in our county. About six thousand acres are now orchards. Last year one thousand one hundred carloads of fruit were shipped from these orchards and I know not how much the increase will be this year, but a large number of young orchards are coming into bearing, others are being planted, so that the outlook in every direction is that we shall have a vast amount of fruit more than we now have. Last year about thirty million feet of lumber were made from our redwood forests: twenty thousand cords of wood were shipped; sixteen thousand cords of tanbark were sent to market; four hundred carloads of charcoal were made; five hundred carloads of posts, pickets, and grape stakes were shipped; five hundred carloads of shingles were marketed. The wool product of this county is about one thousand five hundred tons per annum, and about two hundred and fifty carloads of live stock are shipped per annum. The hop output is one thousand five hundred tons annually, with a prospect of a greatly increased amount in the near future. In hay, five hundred carloads were shipped last year, and, sir, let me assure you, that upon a personal examination of that field of the basaltic rock, it extends from below Sonoma City to the far, far north, occupying a space of about five miles in width, practically inexhaustible while the world stands, and the very best material for paving that has ever been found on the Pacific Coast; and I maintain that the day is not far distant when that rock will be used for building purposes, certainly for the foundations of our great, massive structures. Green corn, wheat, oats, and barley have been shipped to the amount of twelve hundred and fifty carloads. Besides all this, there is a large yield of butter, gilt-edged; of cheese, hides, tallow, and thousands of gallons of the very best milk, daily shipped to San Francisco, aggregating an annual income of another million of money. The poultry product of the county I am ashamed to name, because I fear that my word would be discredited, reaches up and up and into hundreds of thousands of dollars. The aggregate value of the products of this county is estimated at six millions annually, and it is being rapidly augmented.

I have alluded to the fact that our orchards, vineyards, hop fields, and other fields, yielding largely and contributing largely to the incomes of this county, are coming more and more into maturity, and their products will be doubled and trebled in the near future. We have four hundred thousand

acres of bottom land, some writer has said, unsurpassed even in the Mississippi valley, part of what I think is true. The men that own the bottom land along the Russian River scarcely know what wealth is in their hands; they scarcely understand the soil; they seem so imperfectly to till; because it produces almost continuously immense crops, they are indifferent to its value. There are three hundred and fifty thousand acres of foothill lands capable of being planted into the vine, the olive, the chestnut; much of it producing barley and wheat and oats. There are two hundred and fifty thousand acres of swamp, mountain, and redwood lands.

Sonoma County ranks the fifth in wealth of the fifty-two counties in our favored State; but, sir, it will never rank lower in its future brightness. The time is not distant when she will stand brightest and brightest with the very wealthiest. The assessed valuation of its property is \$28,000,000. The rate of taxation for the present year I am sure will not be more than \$1 75 per hundred, including State, county, and even the city taxes, and the school taxes of Santa Rosa. We have, as I have already stated, a population of about forty thousand. These forty thousand will rapidly be augmented from accretions from abroad, for the excellency of the county is going to be understood in the Atlantic States, and it is not an infrequent thing that men come here from even New England inquiring for homes.

I have no time to speak of the flouring mills, the woolen mills, the shingle mills, the tanneries, the fruit driers, the wineries, the dairies, the gas works, the canneries, the planing mills, brick manufactures, foundries, both of iron and brass, marble works, and lime works; it is known abroad that all these industries are flourishing to a greater or less extent in our county.

Santa Rosa has ten churches, a college, three seminaries for young ladies, a commercial college, three kindergarten schools, and all grades of public schools, from the lowest to the very highest; and I maintain, sir, that these schools are manned, and if I may be permitted to coin a word, *womaned* with the very best talent in our land. Our schools, our public schools, are our pride; we commend them to the community and to the world; we believe in them most thoroughly; they are doing a work that challenges competition.

Santa Rosa has a population of about six thousand people. The property within the city limits is assessed at over \$2,000,000; it will never be lower than this. In a few months it will have direct communication by rail with the great overland roads at Benicia, so that we can load our cars in Santa Rosa for New York, for New Orleans, for any part of our Union that we please; and, sir, we shall establish in our suburbs, immediately, the branch of our Soldiers' Home, and if Los Angeles, and San José, and San Francisco don't behave themselves, we will erect a University in Santa Rosa that will make the University of Los Angeles, the University of Senator Stanford, and of the State, tributary to this. We will do more than this, sir; we will build our roads to Bodega Bay; declare it a port of entry, if you please, build a city, and establish a line of floating palaces, attended with a convoy of common carriers to South America and to Australia, and to the other side of the globe; we will seize upon the commerce of the world and turn it across our country to New York and London.

But, sir, I come before you to bid you, and the society with you, a hearty welcome to our city, and in contemplating all these great interests, the thought comes over me that all these are concentrated here. I feel, sir, that I am but one great welcome from the very top of my head to the soles of my feet. I stand before you the personification of welcome from our Board

of Trade, from our Fruit Growers' Association, and from all the citizens of Santa Rosa and of this county.

One word more: When you and your associates return to your homes, it is our desire, for we can wish you no higher happiness, that you dispose of your real estate and return here and cast your lot in with this great-hearted, magnanimous people, and share with us the common blessings that our Heavenly Father has spread around us; this is our heartfelt wish for you. Ladies and gentlemen, I thank you.

THE PRESIDENT then introduced COLONEL MARK L. McDONALD, who spoke as follows:

Mr. President, ladies and gentlemen, I shall not presume to attempt to address you this evening after that most excellent address of Dr. White. He has told our people that, although we have lived here these many years, there are many things that we did not know ourselves, and has brought home to us something that I have often thought of, and that is, the people who are situated in our favored county, in our beautiful valley, possessing the delightful homes that they do, do not themselves appreciate it, do not put the value upon it that they should; and a few such addresses will probably cause them to have a full appreciation of them; but, my fruit-growing friends, there is one thing that occurs to me to-night, and did, as Dr. White spoke of this grand and magnificent county, as he enumerated its products, not only into the hundreds, but thousands and millions, and that is, that we cannot but conclude that this county is almost an empire within itself, producing more than some of the States in this Union can produce; and the question arises, how does it happen that we have such a broad and extensive county; how did it happen that it was laid out so comprehensively, including everything perhaps that can be produced upon the face of the earth. Gentlemen, this county was laid out, was circumscribed by one of these very men that are visiting our brethren to-day; one that had been appointed by this commonwealth; and he is among us as one of our visiting members whom we are glad to entertain to-night. He was deputed by the Mexican Government to come and lay out the lines of Sonoma County, for he had made his home here and knew the resources and just how to lay out a county, to make it rich and make it comprehensive. We are favored with his presence here to-night, and I want you, after this meeting is over, to come upon the platform and meet the man who laid out this county under the instructions of the Mexican Government—I refer to General Vallejo.

THE PRESIDENT: Ladies and gentlemen, nothing gives me more pleasure than to introduce to you General Vallejo. I cannot say more for he is too well known among you. He will now address you.

GEN. M. G. VALLEJO: Mr. President, the Vice-Presidents, ladies and gentlemen. I would be glad if I could speak the English language correctly, but I will try and do my best, to speak a few words to you in my broken English. I desire in this connection to thank Mr. McDonald for having mentioned my name as a pioneer of this county. I had over a half a century ago a presentiment of the future of this (Sonoma) County, or Sonoma District, as we called it in Mexican times. Then it was composed of the present Sonoma County, Marin, Mendocino, Napa, and Lake.

I was then a young man. That is fifty-two years ago, I am eighty at the present day; but deducting fifty-two years makes quite a transformation. I was then young and very active, and the Government had a good deal of confidence in me, and sent me all over the country, from San Diego up to Oregon, to see which would be the best part of the country to open a settlement in. I went first up Kings River, as they call it now. We

called it Rio de Reyes, it was like the Apache country, full of Indians. I had about seven hundred troops under my control, though I was then only twenty-one years of age, to go over to Salt Lake to make an inspection of all this country. I do not remember the names in English, but I came over near Marysville, crossed the mountains coming this way. The Governor, in 1835, after I made my report, sent me on another expedition, passing by the Straits of Carquinez to Vallejo, somewhere there, to inspect all this country, and I made my report in 1835, when General Figueroa was Governor; I told him the plain truth about the Russian River near by. Coming in this way, [pointing] I saw about one hundred and fifty Russians and Kodiaeks on the Russian River, and then I found some other kind of people, not the kinds of Americans that are here now; they were coming in the other way. So the Government sent me here with one hundred and fifty troops to take care of the Yankee folks, and the Russians also. So I stayed here in Mark West Creek. General Figueroa and two engineers laid out a town there. He called a war council and asked the opinions of every officer, if any of them would remain here with some of the troops to settle the country, offering to give them one grade higher. A Lieutenant he would make a Captain, or a Captain he would make a Lieutenant-Colonel, and all that, but nobody spoke; nobody offered to stay. They feared the Indians. There were two hundred thousand Indians here at that time. I was then a young man, a Lieutenant; so I said, "General, I don't need anything, you give me the orders and I remain here." He says, "Vallejo, you write the orders." I took the paper and wrote the orders, giving instructions to me, and I remained there with some troops. After a little I found myself in rather a tight place, The Indians began to make trouble, and I sent a courier to the General, at Monterey, that I was in a very bad fix and was surrounded by Indians, but had no connection with the white settlers. So he gave me orders to select a point near the bay to have communication with the south. So I went down, though I liked this place better than any. But in my circumstances I selected Sonoma Valley and kept two schooners in Sonoma Creek to have connection with the settlement. That was when I was sent here permanently, and when I made my report I gave information in detail, not alone of Sonoma County, but of Napa and Yolo, and around. I laid out myself that old plaza of Sonoma into blocks like in San Francisco. After that I remained there. One day, the fourteenth of June, 1846, I was alone in my house, when about thirty or forty armed men, with rifles and coyote caps, regular mountaineers, surrounded me. A celebrated man among them was very tall, his name was Dr. Simple; perhaps some in this audience knew him. They took me prisoner; I couldn't help it. When you have eight or ten rifles pointed at your head, you can't make any noise, so by compulsion I made a trip with those people, to be locked up in the calaboose at Sacramento, by orders of General Fremont. After being kept there two months and a half I was allowed to come back home to see my family. My weight then was about ninety-six pounds.

But, right or wrong, Fremont came to the head of the Government, and stopped all this trouble; and soon after there were a half a dozen Governors—Commodore Biddle, General Kearny, General Fremont, Governor Stockton, and I don't know—it seems that everybody was a Governor. I was soon after nominated to be one of the Council by Fremont. Colonel Rousseau, a big man, about the size of my friend, Colonel McDonald, was the Secretary of State. Well, I was ready to go to maintain and to make laws or something, when General Kearny came and said, "Don't you go." He and Commodore Stockton came to my house, and I made him a present

of a half a dozen horses, and he went by land, and Kearny took Fremont back. I know the history in Spanish, but I can't explain it in English—only to give you the points. At last, General Kearny was succeeded as Governor, and some other General came, and he went to Monterey; and then there was an election, and at last I went to Monterey as a Delegate to the Convention to form a Constitution. I did not do many things, but I helped right along, and belonged to the committee that reported the Constitution, which at last we succeeded in forming. It went to Washington and back again, and there was a proclamation of the Constitution, and I was elected Senator from this Sonoma District; and when it came to divide the country into counties, I was President of that commission. Nobody there knew anything about the country, so I kept the business in my head, and I made the Sonoma District, Siskiyou, Humboldt, Mendocino, Yolo, Napa, Clear Lake, and Marin. I selected the best land in the whole country, myself, and I say that is Sonoma County. And when I come now, looking in my morning finding here these splendid ladies and gentlemen, civilization and society, Colonel McDonald, Mr. Cooper, and everybody else, I would like to have the power and wings to fly around the country, and see and shake hands with everybody, because this Santa Rosa was in my mind long, long ago, and I swear nobody saw it. I know the country well as far down as San Diego. It is very rich, but not like Sonoma; it is very good, but not better than Sonoma, and I defy contradiction; and no better climate is found anywhere. We have many places here where you may dig without finding a rock. On the Russian River, and in those mountains, there is lumber enough to build Paris, London, Madrid, and the whole world.

When my friend, Mr. McDonald, mentioned my name I felt that I should tell what I knew about Sonoma. I don't want to flatter Mr. McDonald, but he is a benefactor to this county. He has brought it out prominently before the people. The Pacific railroad which he is building we must have. He went to my house and said, "Well, General, we want the right of way through your land." To this I replied: "Colonel, if you want the road to pass between my gate and my house you have my permission, and I would like to see it pushed ahead. I am not a Yankee, but I am a kind of Yankee and a half, and I don't care if the improvements go over my head and stand on my neck, if for the sake of civilization."

I see among you my friend William Boggs. I knew him when he was a young boy; and his son, by the way, is the first California boy of American parentage born in this State. He was born in my house at Petaluma. He came to me with a young, handsome girl, and said he had no place to go. I had a good house in Petaluma and seventy thousand head of cattle and three hundred thousand sheep, and I told him, "You can take it." Isn't that so, Mr. Boggs?

MR. BOGGS—Yea, sir.

GENERAL VALLEJO—I hope you will excuse my English in trying to make a speech. I thank you.

Here the Convention adjourned till the following day at nine o'clock A. M.

SECOND DAY'S PROCEEDINGS.

INSECT PESTS AND THEIR EXTERMINATION.

The President announced the subject for discussion to be "Insect Pests, and their Extermination."

CODLIN MOTH.

(Spray and Band Treatment.)

Essay by E. J. WICKSON, University, Berkeley.

During the summer of 1887 careful observations have been made of the efficacy of spraying with arsenical compounds and of the band treatment for the reduction of the codlin moth (*Carpocapsa pomonella*). This insect appeared in the University orchard a few years ago, and during last year was quite abundant. The success reported by Prof. S. A. Forbes, State Entomologist of Illinois, in spraying with Paris green for the destruction of the larvæ as soon as it begins to feed in the calyx of the apple, and similarly good results reported by several California apple growers, suggested that a set of experiments with arsenic and its compounds should be made in the University orchard, where more time could be given to an accurate account of results than a busy fruit grower could devote to such work. As it was known that W. G. Klee, State Inspector of Fruit Pests, was conducting similar experiments on his own farm, and was keeping accounts of experiments by others, it was thought best that the University experiment should be given a direction similar to his, that the results of all experiments could finally be brought together and serve for purposes of a wide generalization. For this purpose Mr. Klee was invited to prescribe the applications to be made. He did so, and assisted personally in the preparation and application of the poisons—a service for which we make due acknowledgment.

Application was made of three substances, White arsenic, Paris green, and London purple, and each in different strengths, as will be specified in the tables which will be given below. The White arsenic was dissolved in hot water; the Paris green and London purple were kept as thoroughly stirred as possible while being drawn up by the pump. The drenching of the trees was quite complete, the spray being especially directed upon the clusters of fruit which in most cases was still upright, so that the drops of the liquid were caught and held in the calyx end. There was, of course, much difference in the size of the fruit, as the orchard comprises a large collection of summer, fall, and winter fruit. Trees were selected, however, as carefully as possible, which had the fruit of the best stage of growth, say from the size of a pea to that of a small marble, at the time of the first spraying.

The tables will show that in most cases three applications were given, all within thirty days from May thirty-first. During that period the records of the University meteorological observatory show that rain was measured but once, and then but one twentieth of an inch, and in the month of June there was but a sprinkle, even less in amount, so that the weather was perfect for the retention of the poison on the fruit.

The University orchard is planted with two trees of each variety, and in these experiments one was sprayed and the other reserved without treatment, so that a comparison, each tree with one of its own variety and age,

could be made. The orchard was guarded in such a way that no outside interference could be had with the fruit. Twice a week all the fruit which fell from the sprayed trees and from the check trees, unsprayed, was examined and careful entry made in a book prepared for the purpose, of all worms found in the fruit, all fruit from which the worms had escaped, and the number of worms found under the bands of sackcloth, which were placed upon all the trees. This plan of procedure was faithfully carried out until November first, when all the fruit remaining at that time was removed from the trees, examined for worms, and the experiment closed.

The following tables show a summary of results. The full report, with details of procedure and deductions therefrom, is reserved for our next annual report:

Paris Green—One Pound to 160 Gallons of Water.

Fruit.	Variety.	Dates of Application.	Apparent Effects.	Worms in Fruit and Under Bands on Treated Tree.	Worms in Fruit and Under Bands on Untreated Tree.
Pear	Nouveau Poiteau	May 3 and 19	None	10	23
Pear	Nantais	May 3 and 19, and once later	None	4	4
Apple	Red Canada	May 3 and 19, and June 1	None	4	35
Totals				18	62
Gain, per cent				71	

Paris Green—One Pound to 320 Gallons of Water.

Fruit.	Variety.	Dates of Application.	Apparent Effects.	Worms in Fruit and Under Bands on Treated Tree.	Worms in Fruit and Under Bands on Untreated Tree.
Pear	Duchesse Precocce	May 3	None	3	8
Pear	Dr. Reeder	May 3 and 19	None	1	27
Pear	Chaptal	May 3 and 19, and June 1	None	6	1
Apple	Duchesse Oldenburg	May 3 and 19	None	0	1
Apple	Fameuse	May 3 and 19, and June 1	None	9	4
Totals				19	41
Gain, per cent				54	

Paris Green—One Pound to 160 Gallons Water, with Two Pounds of Soap.

Fruit.	Variety.	Dates of Application.	Apparent Effects.	Worms in Fruit and Under Bands on Treated Tree.	Worms in Fruit and Under Bands on Untreated Tree.
Pear	Beurre Gris d'hiver	May 3 and 19*	None	5	2
Apple	Wells' Sweet	May 3	None	3	3
Apple	Duchesse Mignonne	May 3 and 19	None	1	13
Totals				9	18
Gain, per cent				50	

* Considerable settling in can.

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London Purple—One Pound to 160 Gallons Water.

Fruit.	Variety.	Dates of Application.	Apparent Effects.	Worms in Fruit and Under Bands on Treated Tree.	Worms in Fruit and Under Bands on Untreated Tree.
Pear	DeTongres†	May 3	Badly injured	13	21
Pear	St. Michael Archangel	May 3	Badly injured	4	
Apple	Disharoon	May 3 and 19, and June 1	Little damage	9	9
Apple	Yupps' Favorite	May 3 and 19 th , and June 1 st	Little damage	5	7
Totals				31	37
Gain, per cent				16½	

† Two and one half gallons of wash used.

* Strength of second and third sprayings, 1 pound to 220 gallons water.

London Purple—One Pound to 80 Gallons Water.

Fruit.	Variety.	Dates of Application.	Apparent Effects.	Worms in Fruit and Under Bands on Treated Tree.	Worms in Fruit and Under Bands on Untreated Tree.
Pear	Emile de Heyst	May 3 and 17*, and June 1*	Fruit and foliage damaged	19	6
Pear	Madame Treyve	May 3 and May 18*	Fruit and foliage damaged	0	24
Pear	Augustus Dana	May 3	Fruit and foliage damaged	0	4
Apple	Seek No Further	May 3	Badly injured	16	51
Totals				35	85
Gain, per cent				59	

* Strength of second and third sprayings, 1 pound to 220 gallons water.

White Arsenic—One Pound to 320 Gallons Hot Water.

Fruit.	Variety.	Dates of Application.	Apparent Effects.	Worms in Fruit and Under Bands on Treated Tree.	Worms in Fruit and Under Bands on Untreated Tree.
Pear	Callebasse Monstreuse	May 3	Foliage little damaged	4	3
Apple	Grimes' Golden Pippin	May 3 and 19		1	0

White Arsenic—One Pound to 480 Gallons of Water.

Fruit.	Variety.	Dates of Application.	Apparent Effects.	Worms in Fruit and Under Bands on Treated Tree.	Worms in Fruit and Under Bands on Untreated Tree.
Pear	Ott	May 3	None	0	1
Apple	Early Joe	May 3	None	0	17

White Arsenic—One Pound to 640 Gallons of Water, with Soap.

Fruit.	Variety.	Dates of Application.	Apparent Effects.	Worms in Fruit and Under Bark on Treated Tree.	Worms in Fruit and Under Bark on Untreated Tree.
Pear ---	Napoleon-----	May 3 and 20, and June 1---	None-----	1	3
Apple ---	Hall -----	May 3 and 19, and June 1---	None-----	0	No check.

These applications were all made to affect the first brood of the moth. The figures of infested fruit are all small, for in Berkeley, as in most places along the coast, at least, the first brood of the moth was unusually small this year. This fact would not necessarily interfere with the percentage of gain by the treatment.

In the case of the White arsenic the record of worms is so small and the result so contradictory, in that the stronger wash gave a percentage of loss, while the weaker gave a percentage of gain, the inference is that the worms were not on hand to be killed. Undoubtedly allowance must be made for chances of this kind in all experiments including only a tree or two. One codlin moth is said to deposit anywhere from fifty to two hundred eggs, and so a single moth by presence or absence might produce a great difference in an experiment. When the pest is abundant there is of course less danger of such results.

The experiments with Paris green and London purple are more satisfactory, as more trees are included, and worms are found on all, which shows that the moths visited the trees more freely. The percentages of gain must be considered very satisfactory, and the stronger applications, barring injury to foliage, produce the best results. In the case of Paris green, the application of a wash with one pound of Paris green to one hundred and sixty gallons of water must be regarded as very satisfactory, giving a gain of over seventy per cent of good apples and pears and not doing any injury to foliage or fruit. The susceptibility of trees to injury seems to vary with the kind of fruit, and the variety as well, and may be affected by other conditions. This is a matter which needs full investigation.

EXAMINATION OF THE BAND TREATMENT.

In order to determine some points about the efficacy of banding apple and pear trees for the destruction of the larva of the codlin moth, an accurate record has been kept in the University orchard during the past season. The bands were put on early and consisted of strips of old sacks. The strips were five or six inches wide; the ends were allowed to lap well, and the band was secured by a string tied around near the center so as to furnish crevices at both the upper and lower edges, to accommodate worms coming from either direction. All these bands were removed on a certain day each week, the larvæ counted and killed, and the bands replaced. At the same time all the fallen fruit was gathered, examined for worms, or to see if worms had escaped, and records of these facts kept separately. The full statement of this investigation is not yet ready, but a brief summary of leading results may be given as follows:

Row Number.		Larvæ Under Bands.	Larvæ in Fruit.	Other Damaged Fruit.	No. Trees in Row.
Pears	9.....	31	27	71	22
	10.....	42	58	142	35
	11.....	73	42	127	37
	12.....	125	34	180	38
	13.....	56	34	115	38
	14.....	137	34	226	39
	15.....	83	54	226	38
	16.....	45	19	95	15
	16.....	4	1	19	17
	17.....	91	48	202	32
Apples	18.....	57	14	102	25
	19.....	89	89	446	24
	20.....	163	61	320	26
	21.....	83	40	153	25
	22.....	32	22	81	21
	23.....	74	31	191	16
	24.....	3		8	9
Totals		1,188	608	2,704	457

This summary shows that while two thousand seven hundred and four apples and pears were found from which worms had escaped, there were found under the bands but one thousand one hundred and eighty-eight, or 44 per cent; the remaining 56 per cent includes worms which found nesting places elsewhere, or perished. The assistant, who kept a record of this experiment, assures me that he believes many of these were eaten by birds, which were always working over the ground while he was in the orchard. The others must have concealed themselves under clods to spin their cocoons, for there is no loose bark on the trees, and no rubbish or fences in which they could hide. It would seem from this experiment that the bands catch less than half of the worms which gain access to the fruit, and yet the destruction of this proportion of fully fed and healthy larvæ must be considered very satisfactory. As all the losses by birds, or other enemies of the worm, by accident and by other agencies which destroy insect life, must be taken from the percentage of worms not found under the bands, it will be seen that the old method of treatment is still one of the most effective that can be employed.

MR. WICKSON: One word more, Mr. President; you have noticed in some of the papers a description of a plant which in New Zealand is said to be effective in killing the codlin moth. Mr. Maskell wrote to me about it and I see by the Santa Rosa paper that he also wrote to a gentleman on Mark West Creek mentioning a certain plant which they had obtained in the Cape of Good Hope, and which an apple grower down there found was catching the moth. The plant, sir, I have in my hand, and is one which we have been growing at the University some ten or twelve years, and it is somewhat distributed about the State besides; it is a thing that does catch moths and a good many bees, bumble bees and honey bees and butterflies, but we have never noticed the codlin moth, for our attention has not been especially attracted to that point, and it may have been; but the moth which seems most liable to catch in it is a moth considerably larger than the codlin moth, having a tufted sort of a moth. This blossom has an arrangement of its interior parts, which was described before the Academy of Sciences in 1881 by Mr. Stern. It is so arranged that the moth or the bee, in inserting the tongue to suck the honey, finds it easy enough to get it, but can't get out again; it is caught there by its tongue, the mechanism being something of this kind [illustrating]: You see two bars that will

spread very easily like that and allow the tongue of the insect to come in, but when it comes to draw it out, these two parts come together in this way, and the harder the moth tugs the tighter he is caught by a little simple arrangement in the blossom. It is a long vine, grows sometimes ten or twelve and perhaps more feet high, which will climb up a tree or run along a fence; it has rather a pretty white blossom. Here is the fruit, described as something about the size of a goose egg. This part contains a good many seeds; as you open it, it would remind you of part of the old milkweed they have at the East—in fact, it belongs to the milkweed family. The report from New Zealand was that the apple grower there had a hedge made of this a number of feet long in the neighborhood of his apple trees, and he noticed that the codlin moth would catch there, and then the chickens would come around and catch the codlin moth; and he set the trap continually; that is quite a necessary point; because, if you don't have something to come around and unload your trap the blossom can catch just one, and it will stay there until it dries up. Our observation is that more bees are caught than any other class of insect, and perhaps the planting of this vine might settle the vexed question between the honey growers and the fruit growers; because, here is an actual bee trap, and there might be no legal objection for a man to plant it.

MR. GRAY: I would like to ask if the codlin moth is a honey-sucking insect?

MR. WICKSON: The codlin moth has to live upon honey or starve. The insect caught in this plant is the honey bee. The name of the plant is the *Physianthus albens*; it does not bloom the first year from the seed.

CODLIN MOTH REMEDIES.

Essay by W. G. KLEE, State Inspector of Fruit Pests.

During the last year considerable experience in regard to the arsenical remedies or poisons has been gained, and, although we have by no means mastered the subject, we have learned a great deal in regard to their application.

STRENGTH OF COMPOUNDS.

In bulletins issued by me this spring, the strength of solution was left rather indefinite. Later on, in a bulletin issued after the Riverside Convention, it was given at one pound to one hundred and eighty gallons, as it was ascertained that all the samples that were procured in San Francisco market contained a very high percentage of arsenic; four samples averaging about 54 per cent of arsenious acid. If this percentage could be depended upon, the one hundred and eighty gallons to the pound would probably be the average, although, as will be seen later, this strength has proved too strong in some cases. At any rate, it is to be urged that a manufacture on a small scale, which could be depended upon, be established, or that a large quantity be bought—to be uniform in strength—in the East, and guaranteed by the manufacturers.

THE SAME STRENGTH AFFECTING DIFFERENT VARIETIES.

In my experience with the spraying early this season, it was learned very soon that different varieties of fruits were affected differently. Thus, I learned that as a general thing pears were less affected than apples: still

there were exceptions to this also. Of common varieties, the Bellflower on my own place in Santa Cruz proved, for instance, very susceptible to the strength, one hundred and eighty gallons to the pound, causing leaves and fruit to drop. Rhode Island Greening was also considerably affected, but still made a fair crop. Mr. Trumbull, of San Rafael, and W. W. Brier, of Centerville, report the same result. On the contrary, the White Winter Pearmain was not affected, except a few leaves being burned on the edges.

The general spraying of my orchard was done the first time when the tree was well out of bloom, and the second time ten days later. A few trees, with the fruit just in bloom, were tried very early in the season; although a solution of Paris green—one pound to fifty-five gallons—was used, and of London purple of similar strength, the effect of this strong solution was not more noticeable than that of the later week's sprayings, and did not affect the fruit of either White Winter Pearmain apple or Howell pear, on which it was used. The explanation of this phenomenon must be that the surface presented by the leaves at this early date was much less than later on, when the weak solution was used, and that the rapid growth of the leaves dispelled the arsenic from its surface before it had time to act. This seems also to indicate that the fruit blossoms are much less affected than the foliage.

EFFECTS INCREASED BY MOISTURE.

That the effect of arsenical mixtures would be more severe in a climate where damp nights prevail, I became convinced of early in the season, and in my circulars of inquiry tried to elicit some confirmation in this respect, but failed to get it. My reason for concluding this was, that in the case of the Bellflower when the trees were located so as to dry off early in the day, the ill effect of Paris green was much less. Thus, from an outside tree we harvested from the less shady side of the tree five boxes of apples, while from the side facing the next tree in the row and surrounded on all sides by other trees, hardly an apple was taken, and while a portion of the tree in question produced so well, thirty trees adjoining and of the same side and same variety, produced but very little—in fact, only ten boxes altogether. It seems, therefore, that the moisture which naturally would remain longer in the more shaded part of the trees and the orchard as a whole, has the effect of leaching out the arsenic from the Paris green, and damages the foliage or the fruit spurs, causing the leaves to fall, and the fruit, in consequence.

HOW LONG DOES THE EFFECT LAST?

In this connection, the question naturally arises, how long does the effect of the poison last, and how long will it prevent the fruit from being attacked?

From personal observation in Santa Cruz Mountains, I believe that the effect of Paris green will last about two months, having seen it plainly where a heavy dose has been used, and no successful attack of the worms was made before that. As regards the London purple, Mr. G. W. Ousley, of San José, who experimented last year, wrote to me under date of August sixteenth, this year: "From close observation, it is my impression that London purple, if used every thirty days, will prove very effectual; but it will have but little if any effect after thirty days from date of using. In accordance with this, I have sprayed my pears four times with London purple, one hundred and sixty gallons to the pound. No injurious effect on foliage and trees." Shortly after this, I visited Mr. Ousley and found his

pears almost entirely free, and he informed me that he had noticed an increase of worms the last two times he had sprayed.

As I must confess, that I would hardly regard fruit sprayed so many times as safe to eat without a test for arsenic, three samples of pears—Beurre Clairgeau, Beurre Bosc, and Winter Nelis—were forwarded for analysis to Berkeley, and also a sample of apples furnished by Mr. T. C. Settle, of San José, which likewise had been sprayed four times. The result of this analysis was, that not the slightest trace of arsenic could be found. From this I would naturally conclude, that no danger would exist from even four treatments with London purple, if rightly and carefully applied. On general principles I should, however, hesitate to recommend such an excessive use.

Analysis of fruit sprayed twice with Paris green has given no reaction; and, if done early and carefully, I believe it safe to the consumer; but the eating of fallen fruit should be most thoroughly guarded against during the first two months after spraying.

From what I have mentioned above in regard to the effect of moist nights on trees treated with Paris green, it would seem that in such localities the least danger of poisoning to the consumer could result from spraying, as the trees themselves would suffer if used too strong, each part of the tree which received too much naturally shedding its fruit, and, so to speak, refusing to take more than a weak dose.

LONDON PURPLE VERSUS PARIS GREEN.

From observation in various parts of the State, I am confident that the case of London purple versus Paris green, stands thus: The effect of London purple is more severe on the trees generally; and naturally, on account of its greater solubility and less poisonous character, less dangerous to the consumer if used only twice; but its effect as a protective, compared with the Paris green, is less lasting, everything being equal. It seems to be more applicable on pear trees than on apple. I believe that none of the compounds, if used carefully, are of any danger to the consumer, and that they are of much benefit to the raiser.

The present season has been, according to all accounts and personal experience, less productive of the codlin moth, especially in the early part of the season. Not only does this hold good in the coast counties, but also in the interior counties of the State. The effect of the spraying with Paris green has, therefore, been less noticeable. As a general thing, the first brood of the moth was quite scant, yet exceptions to this occur, as, for instance, in the locality where my orchard lies, where early apples in July were badly affected, and the clean condition of all my early fruit must, therefore, be attributed to the spraying, which in this case was done only once; and in August and September there was—at least in many of the coast counties—a great increase; so much so that parties reporting at the end of August only one fourth affected, changed it to only one fourth saved. This was the case when only one spraying of London purple was made.

In my own orchard the results have been very satisfactory, and stand about this way: Early varieties, sprayed once, Alexander, Early Harvest, Gravenstein, not one per cent affected; fall apples, as Greening, this being the worst, sprayed twice—one sixth per cent infected; Bellflower, 3 to 4 per cent; White Winter Pearmain, 2 to 3 per cent; Newtown Pippin, 4 to 5. It should be mentioned that bands were used all the season.

As regards the whale-oil soap and sulphide of potash, or soda, recommended by me this season, I am very favorably impressed with its effect,

so much so that I intend to spray a large portion of my orchard with it next season. Five good-sized Winter Pearmains treated three times show hardly the presence of any worms. As this remedy is perfectly innocuous, even if not quite so effective, I shall prefer it for my own use, and where three sprayings are practiced I certainly should adopt this as the third.

MR. KLEE: There is one point, in regard to these arsenic remedies, I would like to have brought out: I have reference to the different effects on different varieties, and I should like to know if any person here has observed much difference in the effect of spraying. I am satisfied that I lost nearly my whole crop of Yellow Bellflower apples by two sprayings, while other varieties are unharmed, and I know of others that are in the same fix. I believe after awhile, by comparing notes, that we can ascertain just exactly how much these different varieties will stand. I think it is very desirable to bring that out, and I should be glad to have the experience of others on the subject.

A DELEGATE: Mr. Chairman, I used an arsenical spray for my orchard this spring, white arsenic, strength one pound to two hundred gallons, and it killed or burned a great many of the leaves and some of the fruit. My fruit fell off very badly, and I attribute it to the arsenical spray. A friend of mine, living about seven miles from here, had used the same spray on his orchard; but as Mr. Klee speaks of having lost his Bellflowers by reason of the arsenical spraying, and this gentleman had used the spray on all of his trees except his Bellflower trees, which he missed. I think he told me his spray ran short, and he just quit and didn't spray those trees. I was speaking to him about my trees, and he said he had thought so too, but he had those two or three trees unsprayed, and finding the fruit falling off so badly he was very glad that he had left those trees unsprayed, and went over and examined those trees, and the fruit had fallen just as badly from those. In my experiments I did not find that it burnt the leaves or the fruit for three or four days after the spray was applied. Mr. Jones here, who just came in, is the gentleman who made the application, and found that his Bellflowers that were not sprayed fell off the same as those which he had.

MR. KLEE: I will say that the arsenic was used in the same form last year with the same results. Mr. C. J. Settle, and this other gentleman I mentioned, Mr. Ousley, used white arsenic, one pound to three hundred gallons of water, and lost nearly all their fruit, except where it had been sprayed in such a way that none fell on the tree; but Mr. Settle lost nearly all his fruit and concluded from those experiments that it would not do to use any white arsenic, at least in the way he had used it; and the little experiment that was suggested at the University was done with a much weaker solution and did not do any harm to the trees, but I think Mr. Wickson shows that it is the part used with London purple that the good results have come from. As regards the Bellflower shedding, of course I would not be perfectly satisfied that it was from that, but I see every mark of the leaves being affected in that peculiar manner that it affected all kinds of trees more or less, but very much worse on the Bellflowers, causing the leaves to break from the fruit spurs, and, as you all know, when the leaves break from the fruit spurs once, it is generally the end of that fruit. I called attention to one tree on the outside which stands so that it receives the sun earlier and dries off earlier, and that tree on that side turned to the sun had a very fair crop; five boxes on a seven-year old tree; that was a very fair crop on only the two thirds of the tree which was exposed to the sun. I inquired of others, and Mr. Trumbull, of San Rafael, and Mr. W. W. Brier, of Centerville, who had both used it, told me that their

outside trees of the Bellflower were acting the same way, but the interior were not. Of course, it might possibly be from some other cause, but the conclusion was that it was the arsenic.

MR. TOMPKINS: In almost every locality the interior growth bears better than the outer growth. So far as the falling of apples, I do not think there has been a year in ten or a dozen when so many small apples have fallen, owing to the hot winds. At one of the monthly meetings of the Horticultural Society, there were a number sent down from Mr. Gillet in Nevada City, and among those were a number of codlin moth just shriveled up.

MR. JONES, of Sonoma: As to experimenting with arsenic, in the first place, I sprayed one hundred gallons to the pound; I found that too strong for any trees I had, and I then reduced it to two hundred and sprayed every variety of trees I had on the place, and I found a great difference in the effect on the leaves; some would stand two hundred very well and some wouldn't. I had some varieties of apples that two hundred didn't touch, and one variety that one hundred and seventy didn't touch. I sprayed the Bellflower with two hundred, and left three trees; not so much to see what the effect would be on the foliage, but to see what proportion of the apple I could save from the codlin moth. I found the Bellflowers dropping very fast from both I sprayed, and almost wished I had not sprayed them; but I was glad afterwards that I had, for they fell only a few days quicker than those that were not sprayed, but the others finally fell just as bad; as to having the sun on them, I could notice no difference at all. With the Red Astrachan, I found that two hundred burnt everything it touched on that; and sprayed with two hundred and fifty and three hundred to the pound, and found that three hundred burnt the leaves just as badly as two hundred. I sprayed what we call with us the Winter Bellflower, and it hardly left me an apple at two hundred; I sprayed my cherry trees, just to see what effect it would have on the foliage, at two hundred, and you could not see that it had hurt them at all; that is, the Black Tartarian; I put it on the French prune at the rate of two hundred and fifty, and it killed every leaf it touched. That is my experience with white arsenic.

MR. SMITH, of San Rafael: There was a very interesting experiment tried in San Mateo County, about twenty-eight or twenty-nine miles south of San Francisco. An orchard had been planted there in 1859 or 1860, largely of peaches and pears; and about four years ago it was so badly affected by the codlin moth as to be practically worthless, and the owner turned into the orchard his sheep, and found the following year that the percentage of the codlin moth was very much less; and he still turned in his sheep, marketing some fruit the second year, and found that the codlin moth troubled him so little, that he netted quite a considerable sum from both pears and apples. Some of his neighbors have been trying the same experiment, although I don't know what the result has been. He supposed that the reason of the improvement was, that the grub was killed in the process of digestion, as all the apples were greedily eaten by the sheep.

HYDROCYANIC ACID GAS TREATMENT.

Essay by A. SCOTT CHAPMAN, San Gabriel.

At a meeting of fruit growers called at Los Angeles on October 18, 1887, Mr. D. W. Coquillett, assistant entomologist, reported that he had improved on the Morse system of fumigation, in that he had done away with the use

of carbonate of soda, and in its place dried the gas by passing it through sulphuric acid. When thus dried, he reports that he can use it at all times of the day without any injury to the foliage, and at the same time kill all insect life.

Acting upon this new idea, I treated two trees that were wet with fog for twenty minutes each with pure hydrocyanic acid without any carbonic acid. The trees were almost entirely defoliated. I again treated some twenty trees, averaging seventeen feet in diameter, in the cool of the evening, without in the least injuring fruit or foliage. I reported these facts to Professor Hilgard, who said that now the action of the carbonic acid became plain, for being in excess was first absorbed by the water to the exclusion of the cyanide.

The time required to treat any tree remains the same. The amount of material used depends entirely upon its size. Thus the cost of treating a tree ten feet in diameter is for material used about 25 cents. For a tree twenty feet in diameter it is about \$1 80. While this may appear high, it must be remembered that it is the effective killing of all the insects, their eggs and larvæ.

For further particulars I refer you to Bulletin No. 73, Agricultural Experiment Station, University of California, found in our biennial report on page 390.

MR. HATCH: I would like to ask Mr. Chapman if he considers practicable a remedy that would cost \$1 80 to fumigate a tree twenty feet in diameter?

MR. CHAPMAN: Well, a tree that is twenty feet in diameter is an exceedingly large tree, and, if well taken care of, would produce at least ten boxes of oranges per annum. It will cost you \$1 80 to kill every insect on that tree, and if you could prevent the insects from coming there again it would pay you at that price.

MR. LELONG: How high would the tree be?

MR. CHAPMAN: That would be a tree thirty feet high; that is a very large tree.

MR. BLOCK: How do you apply?

MR. CHAPMAN: We generate the gas in a receiver and we place a tent over the tree; we have a framework that we place over the tree and the tent is wound up on a drum, and then the tent is placed over the tree, and the gas generated on the outside is pumped into the tent and left there twenty minutes, and at the end of the twenty minutes we wind the tent up on the drum and go to the next tree. It is arranged so that a couple of men could work about four tents.

A DELEGATE: Does the estimate of \$1 80 cover all expenses?

MR. CHAPMAN: No, sir; that is the chemicals alone, and it would cost you, with three men, about 25 cents a tree running one tent, for if you work ten hours you could not treat more than twenty-two or twenty-three trees.

A DELEGATE: Do you find the insect on the leaves; and does it derive its sustenance from them?

MR. CHAPMAN: I have seen it all over; I have seen it in its younger state on the leaf, not in its old stage. I am inclined to think that it does not derive nourishment from the leaf. I am inclined to think that it grows on the under side of the leaf when quite young, and I am not positive about that.

MR. GLADDEN: The reason why I am so inquisitive, is the reason that I have had such good success in the use of Paris green on other insects that

I am inclined to try it for everything. I have observed those insects running up and down the tree when they become large; they attach themselves to the small stems, and even to the trunk, and there they will stay until all those eggs hatch out; the insect then falls off the trees; the little insects go up and down the tree all the time; the smaller they are, the more active.

MR. A. T. HATCH: The cottony cushion scale is a matter of serious importance to us. There is one thing sure, eternal vigilance is the price of good fruit in California, at least, and a united effort will do great good with any specific practical remedy that can be applied. There has been action taken in times past, which, if utilized as best it might have been, we would not have this discussion here, for then the cottony cushion scale would not have been considered a matter of any importance. Quarantine laws on this matter that were passed at one time, were by selfish fruit growers destroyed, because they did not happen to be technically constituted. Now it stands us in hand each and every one to do his utmost with the best knowledge he can obtain of the remedies that are suggested, and in that way we can discourage if not annihilate these insect pests; certainly, this action is necessary; every fruit grower should inspect his orchard himself, and there should be those who are more capable to investigate, to show those that do not know; very few are well versed in this matter; there are many that walk past the insects in their orchard and do not know what it is, and do not appreciate the damage it will do. For instance, there was a gentleman at Sacramento with some beautiful pears with little red spots upon them, and he showed them to the committee who were passing upon fruits, and how beautiful they were and so forth; and when told that they were the San José scale, he expressed his surprise.

MR. McDONALD: I would like to ask while we are on this question, about the acacia tree being a producer of the cottony cushion scale. Here it is one of our chief ornamental trees. It is really a thing of beauty with us and the acacia is somewhat sacred to a great many people, and we would like to know if it is the opinion of the Convention if it is dangerous to grow that tree; if it does breed the scale then they must go; some say they do, and others they do not, and I would like to get the opinion of the Convention on the subject.

MR. ABBOT KINNEY, of Pasadena: In regard to the question of Colonel McDonald in regard to the acacia tree I can answer from my own experience. I live in Los Angeles County where the white scale is a very serious pest. On my place I have a number of acacia trees planted for ornament. My neighbors on either side of me have the white scale. I have found a little of it in my own orchard and keep it down, but on the acacia trees I have as yet never found any of the scale at all. In other words, as far as my experience goes there is nothing particular about the acacia tree that attracts the insect any more than an orange tree. I think, however, that the acacia trees, through some construction of the bark, are more subject than most ornamental trees are to the insect pests, but so far as the white scale is concerned I never observed any particular taste that that insect has for that particular tree.

MR. GLADDEN: When Mr. McDonald asked the question I almost expected the whole Convention to rise up and answer in the affirmative. I find, with my experience, that it chooses the acacia tree first, the locust second, and in one locality near the river bridge at Healdsburg, there were seven or eight very large acacia trees on which the scale was so bad that, as the gentleman remarked, the droppings became disagreeable. Finally they were cut down. They got from those acacia trees on to every other near tree, even to the willows along the river, and on the currant bushes and

grapevines, and pear trees, but I looked very closely at some peach trees and nectarine trees near those bushes, and not one bug could I find on them; but they have spread around there, and the people of that place have concluded that the acacia is the home of the bug, and they have destroyed very nearly all in the place. Now they are trying to destroy the bug by cutting off the branches of the locust trees along the street—they cut them back to the stubs and then burn them, but there is still the insect, and every year on the new branches they make their appearance again in large numbers. It is so this fall. I am not aware that it has spread throughout the country. We find that it infests walnut trees, and in the neighborhood of the acacias, where they were very abundant, even this wood—known as laurel, or pepper wood—was covered with them, and there are some olive trees in close proximity to the trees badly infested with this cottony cushion scale, and I have looked at them, and I have seen none on them; but the people up in that county seem to think that wherever there is an acacia tree there is great danger.

MR. KLEE: The experience of these different gentlemen as regards the scale insects has been mine; in fact, I know that there has been thousands of acacia trees cut down; one gentleman alone has cut down two thousand trees of his own planting. As there exists over two hundred and thirty species of acacia trees I would ask Mr. Kinney if he knows the exact name of those acacia trees, as there might possibly be some preference.

MR. KINNEY: The two I had were the *Acacia de Currens* and the *Acacia Molissima*; one of them is represented as having a bark containing a large proportion of tannin, but I would like to be thoroughly understood on that proposition; I think that where ornamental trees once become infested with any dangerous insect, particularly one so dangerous and so easily spread as the white cottony cushion scale, that it is impossible for us to hope that any treatment would ever eradicate it from trees on public streets, and that therefore a tree once infested with that class of insects there is only one thing to do with it and that is to cut it down; but I do not think that where handsome ornamental trees that are entirely free from it, you would be warranted in cutting them down because they might be infested afterwards. Another reason, perhaps, why the acacia tree has been so frequently found to be affected in the northern part of the State is that it was originally distributed on them, that in the nursery in which the trees were grown it was distributed just as we have got it in Los Angeles County on the orange tree.

MR. McDONALD: It is true that there has been a great many trees cut down that need not have been cut down, and probably because we got into our minds an idea that certain things existed, that did not exist. Now, I do not want to condemn this most beautiful acacia tree, unless it is absolutely necessary. It is a beautiful tree, especially the finer varieties, the one in which the leaf is so fine and spray like. In my own experience I have been paying some attention to it. I heard some years ago that it was almost the originator of some of those insects, and as on my own place I have two or three varieties I have noticed it, and never yet have I had to spray one of those trees, but to the contrary I have found the scale on the other fancy flowers existed and we had to resort to spraying to kill them off.

MR. GLADDEN: The cottony cushion?

MR. McDONALD: Not the cottony cushion, but the San José scale. I have never found the cottony cushion scale, or any other scale on this tree.

THE PRESIDENT read a letter from Mr. R. B. Blowers, of Woodland,

addressed to the Secretary, announcing that he was compelled to decline as a member the appointment to the State Board of Horticulture.

MR. HATCH: Mr. President, I desire to offer this resolution [reads]:

Resolved, That we, the fruit growers of California, in Convention assembled, recommend to the Governor the name of Mr. Sol. Runyon,* of Courtland, for appointment to fill the vacancy, made by the declination of Mr. Blowers, on State Board of Horticulture.

Resolution adopted.

MR. HATCH: The California State Board of Trade sends by me greeting with the hope for the successful working of the Convention in behalf of the State of California and the fruit growers in particular.

On motion of Mr. Lelong, it was ordered that thanks be returned to the State Board of Trade for coöperating with the State Board of Horticulture, procuring attendance on the Convention.

Recess till two o'clock.

AFTERNOON SESSION.

On motion, it was ordered that the Chair appoint a committee of four to act with himself as a Committee on Legislation.

THE PRESIDENT announced the following names to act as such committee: L. W. Buck, Vacaville; C. H. Dwinelle, Fulton; S. J. Stabler, Yuba City; G. N. Whittaker, Sonoma.

The Chairman announced that the subject under discussion this morning, "Insect Pests and Their Extermination," would be further considered during the present session.

PROF. DWINELLE: I would make a few remarks to encourage those who are inclined to fight for their orchards. In regard to the San José scale, which we all feared so much a few years ago, I have had the most perfect success with fighting it the last year in this county and I believe there is no cause for any one to be discouraged on account of that pest now. An orchard planted a few miles from this place some six or eight years ago unfortunately had the San José scale attack it, and it was not discovered until that insect had made such progress that the orchard was seriously infected. Various attempts were made, first in a small way, then on a larger scale, sometimes under very discouraging circumstances; finally, as far I can judge, with absolutely complete success. The remedy which seems to predominate is the one recommended by the State Board, I believe, and the Inspector of Fruit Pests: One half pound of commercial potash, one half pound of caustic soda, five quarts of water. With the proper proportion, the proper application at the right time, it will not injure the tree and will kill the insects. In the first place, it must be thoroughly dissolved, in the next place it must be thoroughly mixed with water and kept mixed, and then it must be applied to the trees when they are dormant.

Another remedy that has been used is one that has been recommended here: Whale-oil soap, ten pounds; American concentrated lye, one pound; water, fifteen gallons. I wish to say that this should be applied about the time the young insect is seen to move, which in most cases is about the time cherries turn color.

MR. CADWELL, of Petaluma: I have had something to do, not with so many kinds of washes, but with one kind. I don't know but what there are many just as good, but I will give you my experience in Petaluma: I have used it for three years and very successfully. I have abandoned

*Commissioned by the Governor.

spraying my trees in a dormant state. I commence spraying soon after the trees go out of bloom. I go to the soap makers there in Petaluma and get the soap and make the solution. I make it very strong. I dip a limb of the tree in it and then I reduce it some two or three times, dipping in a limb each time. The next day I come around and I can tell what strength to make it. Then I go to work and prepare my wash and generally put it on warm, and I will venture to say you can't find a scale in my orchard to-day, or a red spider, or anything of the kind. This wash is put on thick enough to leave a coating and is put on before the insect hatches out. I used to try to kill the old ones; now I am after the little ones. This wash remains on the tree a long time. It may be that I am in a favored locality. We have considerable fogs in our section, and even if it cracks, the moisture during the night runs it together again, so that it lasts longer than it would in the very dry counties. The eggs deposited on this soap won't hatch. I am satisfied that in washing my trees once a year, that is in the spring, it generally catches all the young insects—everything, lady bugs, or anything. The woolly aphis, of course it is pretty hard to catch all of those, because they originate in the ground, but we keep them in check. I have heard of a good many remedies that may be just as good as this remedy, but the coating over of the tree struck me very forcibly in the first instance that it would be very difficult for those insects to breed when they had to live upon that when they are very young. The last year was a very bad season for the codlin moth in our section and I succeeded, by attending strictly to the bands and washing my trees in this way, in saving two thirds of my fruit, and I don't think there was another man in the county that did as well. My fruit is without any moth, that is, free from the moth this year, so that I am pretty well satisfied with my way of doing it. It may not answer in other places and that is what we have got to look to in satisfying ourselves. Now in putting this wash on I do not go to town, and say to my Chinaman, go and put this on. I do not say to my hired man, do it before I come back. I go myself and prepare it. I get my men and go right with them, and I put it where it should be, and there lies the success of all your washing.

A DELEGATE: What kind of soap is it?

MR. CADWELL: Nothing more than Petaluma soap, and what the ingredients are I don't know.

MR. BLOCK: At what time did you apply it?

MR. CADWELL: I applied it shortly after they were in bloom. On a portion of the orchard the Rhode Island Greenings would be as large as the end of my finger while the others were just out of bloom. I commenced on the portion of that orchard where the trees were out of bloom and the fruit very small.

A DELEGATE: I have used the wash Mr. Cadwell speaks of. I recommend it, but I do not know the ingredients; I think there is a good deal of sulphur in it, and carbolic acid. When you go to the can to smell it it is terrible; it is the strongest smelling insecticide I ever had; the sulphur seems to be more thoroughly incorporated with the soap than in any insecticide that I have ever seen. I think that it is called the Petaluma carbolic wash.

MR. DELONG: I understood Mr. Cadwell to say that by putting the soap on the tree it had the effect that when the eggs of the codlin moth were on the tree that they didn't hatch, is that correct?

MR. CADWELL: That is correct.

MR. DELONG: Do I understand you that a codlin moth lays an egg on the tree?

MR. CADWELL: On the apple.

MR. DELONG: I thought you said that you applied this to the body of the tree?

MR. CADWELL: I spray my trees about the last of May. I wet them all over, foliage and everything; there is not a particle but what is wet.

MR. KLEE: I think that it is substantially the same remedy that I have used as a summer wash, from whale-oil soap and sulphide of soda. It comes very near it, only leaving out the carbolic acid. As I say in my essay, I am very favorably impressed with it.

MR. CADWELL: The ingredients in it are caustic soda, concentrated lye, grease or whale oil, or whatever you may term it, no matter what you use—whether whale oil or grease, sulphur, carbolic acid, and tobacco—it is very easily made.

MR. SOL. RUNYON, Courtland: Mr. President, I have tried pretty much everything, and I have come down simply to a soap, and I have almost made up my mind not to wash while the trees are dormant. I use simply a soap made of caustic soda and potash. What is successful at one season of the year I am satisfied won't do at another. I went to work something over a year ago with an orchard that I have, and marked the trees so I could tell exactly and wouldn't guess any more. I sprayed some of the trees on the sixth of last November with a remedy that I got from Mr. Lelong, now our Secretary. I picked the worst trees that I could find, and went and sprayed those trees, and apparently killed every scale on them—that is, every scale that it touched. I washed my entire orchard pretty much with that wash, and I found a great difference in the time of applying it. I used the same solution right along, and when I got further in the middle of winter it did not kill nearly all the scales; it killed a great portion of them—not all. I sprayed right along, having a large orchard, until spring; sprayed my peach trees; when they began to blossom out, I quit on them. I didn't quite get through, but went on to the apple and plum, which were later. We had a very warm spell of weather in February; after that it seemed to do better work again; it seemed to kill everything at that season of the year; it seemed as if the sun had something to do with it. The recipe is as follows:

Ingredients for one hundred gallons of solution: Two gallons of fish oil, ten pounds of caustic soda, 98 per cent (dissolved in five gallons of water); five pounds of bluestone.

First—Dissolve the soda and bluestone together in five gallons of water. When dissolved, add the fish oil, and stir until it reaches a boiling point; it can then be reduced with water, and applied, but better results are obtained where it is set aside and not used until the following day; it must be applied warm.

That is an excellent wash to do the work. Another thing: I think that a great many people are working in the dark, for they wash and spray right along. We had a dry north wind, and where I sprayed, with those dry north winds, it killed nearly all the fruit buds on my pear trees; but if the wind was in any other direction, it didn't seem to affect them at all. Then this spring, as soon as I could get around to it, I commenced spraying with the following summer wash, that he gave me also:

Ingredients for one barrel of fifty (measure) gallons. Weight, about four hundred and fifty to five hundred pounds.

Ten pounds caustic soda, 98 per cent; ten pounds potash; forty pounds tallow; forty pounds rosin.

First—Dissolve the potash and soda in ten gallons of water. When dissolved, place the whole amount in the barrel to be used.

Second—Dissolve the tallow and rosin together. When dissolved, add the same to the potash and soda in the barrel, and stir well for five minutes or so. Leave standing for about two hours; then fill up with water, stirring well as every bucket of water goes in. Use the following day, one pound to the gallon of water; apply warm.

I sprayed my pear trees with the above soap; it seemed to have an excellent effect and killed all the scale—there are very few scale on the trees to-day. Then I commenced again in September and sprayed again with the same soap and the same strength, and it seemed to me that it did not kill the scale where it had in the spring. We have to notice all these things, and it is a pretty hard matter what to do and when to do it, unless we keep practicing. I believe we can keep them down. I do not believe I have one scale where I had a hundred a year ago; still, unfortunately, I have some yet. Both of these soaps must be applied quite warm, and you cannot apply them unless they are warm. But there is another one that is applied cold, and hardly any fire is required to make it. We call it lime soap, which is found on page 377 of the biennial report. The wash known as the Woodberry wash has been used pretty much along the river; I have not used it myself, and is, perhaps, the only thing that I have not used. This wash was gotten up by Mr. Green—some call it the Green wash—seems to do very good work where it is properly applied. I do not like it myself; it contains petroleum (coal oil) which makes it very difficult to mix right; those washes I have spoken of are easy to make. I am satisfied that this soap is best to be used in the summer, and I think it will be the best remedy we can use. Tree growers should make their own soap; there is always plenty of water on the ranch, and that is the most the soap contains anyhow. You have only to buy a few ingredients and make your own soap.

MR. BUCK: There is another fruit pest that I have not heard mentioned, and that is the peach moth. It has assumed very large proportions in this section of the State, and has done a large amount of damage this year, especially in some localities and with some varieties. The moth does not always work its way through to the pit, but wherever the peach is touched by one of those moths it will rot before it reaches its destination. Now, this year there has been a very large amount of peaches shipped East, probably ten times the amount there has ever been shipped before. They have carried in generally very good condition, with the exception of those that had the moth in and that necessitated the repacking the most of the lots of peaches that were sent East. I have never seen anything that was given as a remedy for that moth. It is a moth that attacks the tree early in the spring, and is worse in early peaches than in later ones. It generally attacks the earliest variety—the first of those that ripen. I would like to call Mr. Klee's attention to that, and ask him for his advice.

MR. KLEE: I have been under the impression that the peach moth had been less destructive this season than last year, and I am sorry that I have made a mistake.

MR. BUCK: I would state that my judgment is that all the moths have been less troublesome this year than last. They have worked less from some cause. The codlin moth was not near as troublesome as it was last year and that may be true of the peach moth, still there were some varieties of the earlier peaches that were boxed and sent East and I believe that one half had the moth in them.

MR. KLEE: The peach moth has been known in the State for quite a number of years and it is spreading all the time. It is one that needs close attention by the peach grower, and if we could get people to drop the return box system that would be a great point gained. It is certainly bound to spread gradually from place to place under the return box system. As regards remedies for it, I have found that on the Sacramento River, since spraying with washes has become quite the thing there, and since it has been done pretty thoroughly, there has been a great falling off. The

insect works on the tree too, and seems to penetrate the young, growing shoot in the spring of the year. Washes seem to prevent them from entering it, and it is the second brood that enters the fruit; and hence if you are destroying the first you are cutting short the next. That is the only remedy that I know of.

MR. WOOLSEY: What is the best wash for it?

MR. KLEE: The soap wash as a general thing in the winter time, and then very early in the spring any kind of a good summer wash. It don't seem to make very much difference as long as it is a wash and applied properly. The history of this insect has not been worked out thoroughly, and it is one that wants to be given more attention. In the Eastern States and in Europe this same insect is said to infest the strawberry, and I thought at one time that it probably had been brought by strawberries here, but I am not aware that it ever has been found in the strawberries.

MR. TOMPKINS: There is another thing that makes a good deal of trouble in our apricot, you first find it in the spring rolled up in the leaf; it is about fifty per cent larger than the codlin moth, somewhat of the same general color with a slight reddish tinge and brown head. It works into the apricot in the same way, that is, it leaves very much the same trace that the codlin moth does in the apple, and at the end of the season they roll up in a leaf and fall to the ground. You find a great many nearly a quarter of an inch in diameter; they appear to pass the winter in the ground and in the spring appear again.

A DELEGATE: I would like to ask Mr. Klee if he knows that the peach moth will enter any other fruit?

MR. KLEE: It will be found in the plum and apricot. I have never been able to get a mature moth of the kind Mr. Tompkins speaks of, and I really do not know what it is. I saw it last year.

MR. WOOLSEY: I have found that same thing, identical I think with the peach moth in the prune, working in the same way precisely, going in at the point of the young growth. I suppose it is the same thing.

MR. BLOCK: I found it for the first time this year in the peaches, and I have no return boxes. This is the first time that I have noticed it. They act somewhat like the twig borer. I will tell you what I have done with the twig borer, and it might give you some opportunity to experiment and find a better remedy. Two years ago I was bothered a good deal by the twig borer in the plum and pear and I went and took a small oil can—that is, one that is used for a sewing machine—and put in some coal oil and put in a drop. That was done very quickly and very inexpensively, and it would kill the borer. Now I think if the same thing were to be tried on this peach moth, that we could exterminate him. I have destroyed them where I had a large tree, and it cost but very little. I started out with two men and in a day and a half covered a large space of ground, where nearly every tree was infected and I have had no further trouble—that is with the twig borer. I think it would take a little extra trouble to exterminate them.

A DELEGATE: There is one other thing which is a very great trouble. I don't know how to get at it. It is a small, spotted diabrotica (*Diabrotica vittata*). We do not know anything about it in its dormant state. It is a very gross feeder, and for that reason when it attacks young trees it is very easy to kill them with Paris green; but when it attacks the ripe fruit, commencing on the apricot, just as the fruit is commencing to get a little soft, and eating into the fruit, then it is impossible to kill them. The only thing that is to be done is to drive them away, and so some of the orchardists last summer in Suisun Valley were making fires all over the orchards;

making smoke to drive them away. They might be temporarily effectual, perhaps, but not very satisfactory. I do not know whether Mr. Klee has discovered anything more about its habits, but I have never seen anybody that knows how to get at it in the winter time or where it hibernates.

MR. HATCH: I think that we find the larvæ sometimes on the fences, and something that occurred a year ago this summer convinced me that stubble fields were good places to find them in. There was a stubble field on one side of some apricot trees that I had and there they worked the most, and very successfully to them and harmful to me. The trees were large and full of apricots and from which I received no revenue on account of them. The stubble fields and corn fields I think are good places for them to propagate in, as where my fruit trees were adjacent to them they were attacked the most.

A DELEGATE: For that reason it might be well to plant them in the orchard and then spray the vegetable crop with Paris green.

MR. HATCH: I believe that if you plant such things in the orchards there is liable to be more on the peaches and still more on the squashes and corn.

MR. KLEE: I regret to say that I know nothing more about this than when I wrote a little about it in the last report. A friend of mine has also tried to find out what has become of this insect and where the larvæ is, and we have both been unsuccessful. Last season I penned up the larvæ of these insects in a box, with wire screen over them. They laid there two months and then disappeared under the top of the ground. In the spring time I naturally looked for some diabroticas in this box, for there was no way for them to escape, but nothing appeared; consequently I am certain that I did not get them in the right condition. They don't seem to thrive in confinement and I despair a little about succeeding. My idea was where they lay the eggs that we might dress the ground with something like a slight dressing of gas lime, which proved very effective in killing the grubs in the ground. The trouble is with the insect that wherever it is it will be found all over the place; it is everywhere. There is a great difference in the different localities. On sandy bottoms it is very bad and the man will tell you that it is the worst thing that comes to the place, that there is nothing like it, and then you travel for three or four miles further and there is nothing heard of it. One thing certain, very few of them remain alive in the winter season. I saw one orchard that was sprayed with water during the season and then the tree had been shaken and the insects fell in large quantities on the ground and were burnt up, but that is altogether too expensive. It is a matter that requires more investigation. Smoke sometimes drives them away. Some people have told me that they have been very successful in driving them away by smoke, and others find by experience that they come right back again.

MR. DELONG: Several years ago Mr. Cooke made a visit to my place, and in going through the orchards we noticed on the ground several of these spotted diabrotica and his attention was attracted to it; he got down on his knees and says let us investigate this a little, and he commenced digging in the ground; and he became convinced at the time from the little shells that he found, that they had hatched; and after digging a little further, he came in contact with one that was just about coming up, and, by a little assistance, it broke from its casing and made its appearance; and I know that at that time he was perfectly satisfied that these things hatched in the ground. I never had any idea that he thought they ever hatched in the boxes or on the trees; it was more like the saw-fly of the pear tree; and the cases they were in resembled those very much,

although those were nearly white, while these were more of a dark brown. He said that he knew of no good way to eradicate them; after they were once loose they would have to grin and bear. I have a piece of marsh land on which I have Australian rye grass and some little alfalfa mixed, and last year I went out on the marsh and it was literally alive with them. I am satisfied they will feed on green substance until the fruit is ripe, and when the fruit is ripe, I don't think that is any temptation, that they prefer the fruit to anything else. I would like to ask if there is any one here who has had any experience with the woolly aphis on apple trees, and if so, after the woolly aphis has gone to the root of the trees, what their treatment is for it, and whether the tree ever dies from its effect.

MR. WICKSON: Before they take up the woolly aphis, I would like to make this remark: that what Mr. DeLong has mentioned as the finding of that insect is exactly what we would expect, because the nearest relative to that twelve-spotted diabrotica is the striped cucumber bug, which is also a diabrotica, belongs to the same genus, and on that account it is believed that is the place to find the larvæ of the twelve-spotted diabrotica. The State Entomologists of New York recommend for the twelve-spotted diabrotica a spray of one ounce of saltpetre to the gallon of water. It would have to be determined by experiment whether saltpetre can be applied to fruit trees.

MR. HATCH: I wanted to ask if there was any one here who has had any experience with their pear trees growing slowly, the young trees, and then the ends of the twigs die, the ends or the tips of the tree dying back, and, if so, if they know any remedy for it. There was a gentleman, whose orchard I was through the other day, showed me something of that kind that I had not seen before, and I wanted to bring it here for your consideration.

MR. GRAY: I wanted to speak of that very subject. A young pear orchard at Chico has been affected to quite an extent this year: I noticed it first during the hot weather we had in June; it acts very much like the blight of the pear in the Eastern States that began about twelve years ago now, and during the four years since that time that I was in New York a great many orchards were entirely ruined; the only remedy for it was cutting off of the dead limbs, and some of the finest orchards in Central New York were cut in that way until there was nothing left. The question is whether it is the pear blight. It acts something like it on one limb on one side of the tree, and another on the other side of the tree, and sometimes skipping some trees in a row.

MR. SHAW: I had one pear tree a few years ago that was affected that way and found the butt of the tree was literally bored full of holes and a little black beetle in those holes, which were not bigger than pinholes.

MR. G. N. WHITTAKER: Last fall I applied fresh slacked lime on my apple trees for the woolly aphis with very good results, using about a peck to a tree, say twelve to fifteen years old, leaving a small amount of soil between the lime and the tree. I dug a trench big enough to contain all the lime and then threw the dirt back over the lime and covered it up entirely. This I done last fall about the time the rains began, and I think that I done it with very good success, for this year I have not near the amount of woolly aphis that I usually had, and a great many trees have not any. My opinion is that the woolly aphis will eventually kill the tree if there is not the right treatment. I have a few trees in one corner of my orchard where it first appeared, and I knew nothing about it at the time that it appeared. I believe that it was on the roots several years before it made its appearance on the foliage, from the fact that I dug those trees

up, and the roots were in all manner of shapes; they were deformed, and great knots and lumps on them, and I dug up and destroyed some ten or a dozen, and doctored the other trees as I have stated.

A DELEGATE: Does it originate on the root?

MR. DELONG: I think so. I think the wood is softer, and can be got at better by them; the lime acts as a fertilizer, too, as well as a remedy.

MR. GRAY: I think ashes would do just as well as lime. I have seen the woolly aphid very much reduced; I don't know that it could ever be exterminated. I don't think that the woolly aphid will ever kill an apple tree. I think that it will stand a generation with the woolly aphid on the tree; it will do damage all the time, but the roots seem to be extending out, and I think that it will live a long time but may not bear much fruit; but, by continually putting ashes on the tree, and not very strong ashes either, they do not come up through the ashes to the top of the tree, and I think that by keeping them down they are diminished, and by using a little coal oil with a small brush or swab around where you see the most of them above the ground two or three times during the season, a great many of them would be killed. I know that we have not one, where we had a thousand three years ago.

MR. RUNYON: I would have to differ with my friend from Chico about its not killing the tree, for I have had quite a different experience from that; I am satisfied that it killed about two hundred trees for me, a portion of which were quite dead and the balance I dug up; and this was on land that was as good as there is in the State; they had been on them for some eight or ten years. It will affect the Astrachan apple the least of any I had, and I had the Baldwin and Bellflower; the Pearmain it didn't affect much. I have had a few pear trees on my place that acted as the gentleman's. They have been dying out for some three or four years. I am satisfied on my place of the cause, from the land they are on. Along the Sacramento River we have spots quite strong with alkali—we have spots about the size of this room so strong that nothing will grow, and perhaps within a rod from that there will not be any. I have come to the conclusion that those trees on my place die back, because there is alkali in the soil.

MR. HATCH: I was speaking to Dr. Harkness, of the Academy of Sciences, in regard to the matter, and he thought it was not a fungus and it must be something in the soil that would cause such a result. He had no opportunity to investigate, but on general principles judged that.

MR. KLEE: In regard to the woolly aphid I have no reason to change my recommendation for using gas lime, except that people should be quite cautious about its strength, according as it has been exposed to the air and rain. I believe that lime is also good to a certain extent, but I believe that gas lime is more effective. I have tried it on many badly infested trees and they have picked up wonderfully. In regard to the woolly aphid killing a tree I think it will do it. It depends a good deal upon the soil. On a sandy, dry soil it will do it the quickest; on a rich soil it will actually hold out longer, but I believe in that case it will always cause the fruit to be smaller and smaller as it increases, naturally sapping the vitality of the tree. Hence, whether it kills it or not, the tree will gradually become to some extent useless. As regards pear trees being affected, it is something that requires personal investigation and it may require some time. If it is the pear blight it is a very serious matter, because we supposed our climate would make us free from the pear blight, and I propose this season to give it as thorough investigation as I can. I believe from general observation

that a good many cases must be attributed to the management and bad selection of the soil.

MR. TOMPKINS: Out of about two hundred and fifty young pear trees planted last season there was possibly a dozen planted in very heavy clay and adobe, mixed with very heavy clay subsoil, and almost every one of these died right out, first from the top and then gradually way down.

MR. DWINELLE: I want to say in regard to the woolly aphis, that some years ago at the University, when these experiments were going on, I had occasion to meet a very intelligent gentleman, the Consul from Chili, who took great interest in agricultural matters and was considerable of an entomologist, and he told me that the woolly aphis some years before had nearly exterminated the wild apple in Chili; that the common apple had to some extent run wild in that country, and this pest swept through the country and destroyed quantities of it. In this State I have seen a great many trees that were practically worthless on account of the attacks of this insect; they were so dry and unfruitful that they had better been out than in the ground. I think, as Mr. Klee suggests, that soil must have a great deal to do with this as it has with phylloxera. We know very well that in some soils, generally the adobe and the rich ones, the vine will resist the phylloxera without any aid, whereas where the soil is thin and the hardpan near the surface the vines grow very quickly before the attack of the insect. I want to add that drainage is important. I know some experiments spoken of. Where the drainage was poor the trees were killed, but where there was better drainage to the soil the trees suffered less.

MR. CADWELL: As to the woolly aphis, I have tried for three years to see if I could not find some mode of destroying it, and finally succeeded. I may come in conflict with Professor Dwinelle, and some other learned gentlemen, but my information was from them and from others, that they propagated and lived in the ground; that they went into the ground in the fall and in the spring came up and spread over the tree. That was my first impression. My next impression was that they laid their eggs on the trees in the fall and hatched out in the spring, and continued on the tree, both root and branch, till they destroyed the tree, or at any rate the crop. I will not tell you how many experiments I made, or in what way. I did succeed finally in finding out after they had grown to full size on the outside of the tree and commenced traveling around it. In the evening, generally of a pleasant day some time towards the last of May, they hatched out and then they start off, and the next day you will see them with small wings. They are generally the same color as the tree, and don't fly till some time after they have wings, but keep working around the tree, so that in every direction it would be covered with the aphis in bunches and in knots. In a few days they begin to fly, and turn an amber color before they lay their eggs. I have found after spraying my trees, and I supposed that spraying the trees destroyed them, is a reason that I don't have any there yet. There was a theory that they laid their eggs in the fall of the year and hatch out in the spring. I don't approve that, from the fact that in two or three days it would grow, and on every leaf you would see the woolly aphis. I am satisfied that those eggs were not laid the fall before—that was my experience in that direction.

MR. KLEE: Some years ago I tried at the University the putting of bands around the trees, and I failed to find any traveling. I concluded that they exist in two forms; probably a root form and a branch form, which exist independently of each other; I am satisfied that it is so, and at

certain times they are interchangeable, which is something not unusual with that type of insects.

MR. F. C. DELONG: Hasn't it been a general idea that this is a sort of blood louse or something of that kind, that the insect is of that nature? Certainly in touching it, if you rub it with your finger, it has a bloody appearance while it is on the tree. The theory always advanced to me has been that this is in fact a louse, and that it remains in this State on these trees after hatching out. What it is hatched from we do not know, but it is there on the tree; after remaining there a certain length of time it descends and goes on to the root, and after having once gone to the root it never returns again; and each successive season, as it appears on the tree, it simply goes on increasing and increasing. I have asked the question as to the experience of others, whether it kills trees or not. I know now of trees on my place that certainly have been there over ten years, and those that I have talked with say that they have known it there over twenty; and the tree is still bearing good crops; and I think very likely that the fruit has been from time to time growing smaller and smaller. I have had a theory that where the trees are affected in this way, the only real known remedy is by relieving those trees of the growing crops or making too much wood. Or, by cutting them back or grafting them over, it will give the whole use of the ground to a small proportion of the tree, thereby allowing the tree to regain its strength without resorting to fertilizing; and in that way I worked over trees that I know and have known all along were affected with the woolly aphis, and those trees are growing well to-day, giving fine crops; some I have worked, over four years ago this coming spring, bore some fruit this last year, and the fruit was fine and in large quantities; the trees look well and appear well. If they were held back I do not see why that is not just as well, where the fruit becomes unmerchable, to give the tree a rest for two or three years by working them over as to resort to fertilizing. I wanted to advance that theory to see what the gentlemen here think of it. I was asked the question several years ago how to eradicate the evil, and it was advanced by some that tobacco juice would do it, others by digging a trench and putting in fresh tobacco leaves and covering them; in some instances I tried it but I do not know actual results. In answer to a question I asked Mr. Cadwell, he says that he has not seen the woolly aphis on his trees at this time of year; certainly you can see them at my place in the spring of the year, say the latter part of April and the first of May, and I can show you any quantity now. The place where they are now is on the new wood and in and about the bark, and it assumes at this time of the year a very busy appearance. On looking a little closely at the wood of the tree these little accumulations in what I call in the form of larvæ, if you touch that with the finger it will come out something like the appearance of blood. If the gentlemen can advance any theory that will show that these do not go down on the root and that they do not lay any eggs I would like them to advance it, because there must be something left there for the new crop year. If the gentlemen's theory is all right that they travel to the root and do not return, they must have left something to produce the new crop.

MR. CADWELL: My experience is as I said before, spraying these trees in May destroys the eggs and the aphis if there is any left, and they lay the eggs on this coating of soap and they do not hatch out. Now I do not say that they do not hatch in the spring around the roots of the tree and come and fly around and deposit their eggs; that would be the presumption that that is what they do because I have not got rid of it.

MR. WHITE: While living in Los Angeles I had some large apple trees

between the rows of oranges that were taken out, and we found that they were badly infested with the woolly aphis, and on the roots were knots as large as a man's head and a number of smaller ones. Many of them were opened to see what was inside, and they seemed to be full of cells or openings through which a bug or worm might pass. I don't remember whether we found any live bugs in those roots, but I think we did. The trees were not healthy and the fruit was not large, but I don't think that any of the trees showed any indication of approaching death. Now in my orchard in this city I have the woolly aphis, and you can find them on the trees every month in the year; I think you can see them to-day. I have rid the trees of them several times by digging close around them and applying with a sponge a little turpentine, which kills them instantly. Coal oil will do the same thing. It does not take a great while to rid a pretty large tree of the woolly aphis in that way, but in three or four weeks the woolly aphis will appear again, and hence it is not a permanent remedy. One day I had occasion to use some common furniture varnish about the house, and near the house there was an apple tree that a limb had been cut off of, and all around where the break was was a large number of woolly aphis. I took the brush fresh with the varnish and coated it over, and I believe that is over a year ago and I have never seen a woolly aphis on that particular place from that time to this. It killed them instantly, and it has been an efficient remedy thus far. How long that will continue is more than I can tell you.

MR. DWINELLE: I want to speak briefly of a remedy for the woolly aphis, which it may be desirable to use once in awhile, when that insect makes a sudden increase, as it once did in the University orchard, and every little twig looks to be three times its normal size, because it is covered with the woolly aphis; the tree does not grow and is in a very bad way. I refer simply to the remedy which Mr. Cooper has spoken of as good for the black scale on the olive; namely, tobacco water, at a strength of two or three gallons of water, and it should be at a temperature of about 130° in a barrel; furthermore, it can be applied with a nozzle, using at least as much more as the San José spray. We detached the diaphragm and simply used a wire strainer, so it kept giving considerable force to the liquid, and with that accomplished a practical cleaning of the orchard at one application. I immediately noted a very considerable difference in the foliage, general thrift, and the apples enlarged very perceptibly and filled out rapidly.

Now in regard to this so called blight of the pear: I have not seen the particular thing, but I well remember the old blight in New York; that is not necessarily an attack upon the very tips or top of the tree; it may be a top or side limb that suddenly turns black, as if you had dipped ink on it, and the bark shrivels down, and that part of the tree is ruined. The only hopeful remedy is to cut out way below any part that is damaged from the blight. I never saw any in this State that was identical with the true pear blight.

MR. HATCH: One word about the pear: From what I have heard the gentleman say, I have a formulated theory; it comes to me from this: in one place I noted, where these trees were shown me, trees around them had grown every year and done well before, and began to show it this year for the first time; my theory is that it is the soil, and in those places it is stronger than it is in the surrounding ground. Those trees have grown longer and the roots have reached that point, which destroys or assists in destroying the trees. In places I have seen trees planted that flourished well for years, and until the roots touched a certain point of depth, and the same results had been observed for twenty years or more;

that trees would live for about so long until the trees had reached a certain depth and then die. It may be the same in this case.

MR. DeLONG: One thing that I would like to ask: About two years ago in making a report to the County Board, I stated the fact that there was something that assumed the form of a small beetle, yet it looked like a centipede on a small scale, that had been fighting the moths by killing the larvæ and that was better than the bands. In the latter part of the season I discovered under some of the bands that they took a notion of eating the worm. We all thought then that this was some parasite that had come along to rid us of the pest. I noticed it that year considerably; since then I have never seen one of them, and I think Mr. Hatch said that he had noticed some of them in his orchard. I would like to ask if any one has noticed the return of them. It was what I called a little black beetle with a number of legs. I supposed the reason why I have not seen it was that I had washed the trees with a strong solution immediately after I had taken the bandages off; in fact I have never seen any since.

MR. HATCH: Before we leave this subject I would like to say that there is a tendency to close planting of the trees. When I first planted out trees I was told to plant fifteen feet apart, and put them sixteen; I found it was necessary in the course of a very few years to dig up half of them; afterwards in planting trees I put them twenty feet. I find out now that I have to dig up half of them; and I think if in planting we increase our distances, we will improve our profits and the appearance and health of our trees, which go to make up our profits; I have got them twenty-four feet and now I am going up to thirty. I think although some trees are considered as not needing so much land as others, that by planting peach trees twenty-four feet apart I get more per acre where they are the same age than I do at twenty. I know this is strange for a man to say who has trees to sell, but as I am pretty nearly sold out it won't do me any harm this season. I propose to plant a few trees this year, and I propose to plant most all varieties thirty feet apart in squares.

Adjourned until to-morrow morning at nine o'clock.

THIRD DAY'S PROCEEDINGS.

SANTA ROSA, November 10, 1887.

The Convention reassembled pursuant to adjournment, President Cooper in the chair.

FRUIT PACKAGES.

MR. TOMPKINS, of Alameda, read an essay on "Fruit Packages," as follows:

There has been no material change in boxes or crates this past season. As a general thing they have been made according to the sizes declared standard at the Fruit Union meeting in January, 1887. The quality has been above the average, but on account of high quotations for lumber the price has been somewhat higher than heretofore.

The weights that the different sized boxes will hold are overstated in the

schedule in several instances. The weights given are supposed to be net, but they really represent the gross weight. The four-inch plum box is put down as holding twenty pounds of fruit; sixteen would be nearer the truth. The apricot and peach boxes fall short in about the same ratio, although the way in which a box is packed is an important factor in counting the loss. The cherry box comes nearer the mark than any, often holding more than the ten pounds given it by the schedule. The sides composed of two strips were little used, the main objection being the extra work in putting them on the box, although some report that the fruit carried best in boxes of this pattern.

In nailing boxes together wire nails have been largely used, and are much better than the cut nails, splitting the wood less and holding better. The price per pound is about fifty per cent more than for the common nails, but there are so many more wire nails in a pound than there are of the clumsier nails that the difference is more than made up by the better work of the wire nails.

So much for the packages. Custom and practice have shaped them somewhat as we want them. If as much could be said of the manner of packing, the fruit business would be the better for it. The average box is very badly packed; in some cases the fruit about half fills the box. Even where the box is well filled, the difference between the top and bottom fruit is something awful. Good fruit at the surface, rubbish underneath; not only in boxes packed for the local trade, but actually in the large boxes of fruit sent in loose, where it is the simplest matter in the world for a buyer to move aside the three or four respectable uppermost specimens, and lay bare the rubbish of the lower levels, which does not put him in good humor with the fruit or with the man that sends it.

A limited but painful experience in buying fruit in the San Francisco market gave the writer some idea of the importance of uniformity and honesty in packing fruit. A buyer soon finds out where he gets and where he does not get what he pays for. Of course there are times when the best of fruit will hardly pay for its boxes and freight, but at such times poor fruit is dumped, although good fruit at least does not leave a man in debt.

It is undoubtedly a hard undertaking to build up a reputation for honest work. Your men have been brought up on the other plan, and it is no small matter to get them out of their old habits. The picking season is always a rushing one, and skilled help is invariably scarce; consequently it is the easiest thing in the world for careless ways to creep in the packing house. Right here is where better and more attractive work must be done. Perseverance in well doing is as needful here as in all other walks of life.

Fruit in bright, clean boxes will almost invariably sell at an advance over fruit of the same grade put up in rough or soiled packages. Layers of paper in the top and bottom or the boxes almost entirely prevent bruising, and add greatly to the looks of the article. I am not sure but that it would pay with a fine grade of fruit to wrap each piece in the way it is done for eastern shipment. Put up in this way it will keep in good condition much longer than when packed loose, and consequently is in demand for shipping to interior points that are out of the fruit belts, and especially to points on the northern coast. Any one shipping fruit put up in this way, should, if possible, get it to the San Francisco market on the day before the Oregon steamers sail. These steamers leave two or three times a week, and frequently take large quantities of choice fruit. All the San Francisco papers give the sailing days.

It is impossible to give anything more than the most general directions for packing fruit, in an article of this sort. If you wish to see packing as

a fine art, go to some point where men who understand the business are packing the eastern shipment. Watch their packers closely and try it yourself *on the spot*. Don't leave until you fully understand the wrapping and placing the fruit and can do it with reasonable neatness and speed. If you are within a day's journey of Sacramento, go and see Messrs. W. R. Strong & Co. do it. You will be well repaid for your journey.

A DELEGATE: I would like to ask Mr. Buck what variety of plums have been shipped heretofore. I see that plums sold at higher prices this year and apparently went through in better condition.

MR. BUCK: Any dark plum or any colored plum sells well in the East; and until the market is absolutely glutted they sell well all the time whether they are extremely early or even later; sometimes later in the season with the prunes the market gets so glutted that they sell cheap.

MR. GLADDEN: We have in this county a good climate and very fine soil for growing plums; but heretofore it has not been planted on account of the outlet.

MR. BUCK: The plums of Sonoma and Napa Counties I think are the finest in the State.

MR. GLADDEN: Instead of planting plums I venture to say that in the last three years there has been at least twenty-five per cent more prunes planted with the object of drying.

MR. BUCK: You need not plant additional plum trees for fear that there will not be plums enough in the State. I think if anything is overdone in this State it is plum planting to-day; but one reason that they have brought fair prices is from the fact that they were very light in some places; they do not want a light plum, they want a colored plum. I have shipped some of the finest Gage plums that I have seen this year and very few of them will sell.

MR. HATCH: I believe there are localities especially adapted to the growing of the plum a superior fruit, and in them I would plant some trees of the better shipping varieties.

MR. BUCK: I do not want to discourage any man from planting plums, but I do not want to encourage him by anything I may say to go into very extensive plum planting, because as I said before, I think there is a large acreage of plums already planted, and the prices they brought two years ago I guess would bear me out.

MR. HATCH: And probably they might have Tokay grapes, so notably fine here.

MR. BUCK: Your Tokay grapes are always fine from this county. There have been shipped from here the finest Tokay grapes that I have ever seen. I do not consider the Natoma anywhere near as fine as I have seen in Napa, Sonoma, and Santa Cruz Counties.

MR. HATCH: They are experienced in picking and packing properly in Natoma and that is the reason that they get more.

A DELEGATE: How about the peach plum if it ripens late?

MR. BUCK: There is only a few peach plum trees in the State. Around Sacramento and Marysville the peach plum shipped this year and last brought enormous prices, that is, from \$2 to \$4 a box of twenty pounds. It is certainly a very fine, showy plum, and I don't know why it wouldn't sell if a month later. Now what I have said about plums would not be a criterion for a man to keep him from planting plums, if he could plant a variety that would come in a little later here than they do in other places and consequently find a good market. Now from what you suggest in reference to the peach plums I think that they might be well planted here. Now, at Vacaville, the peach plum won't bear, and if a man would give

me the land and the trees I would not plant a peach plum in our valley; they won't bear enough to pay for pruning. It bears well around Sacramento and bears fairly well at Marysville.

MR. HATCH: I have got the peach plum, but I didn't buy them under that name, I bought the yellow egg and they sent me peach plums. I got twenty-eight boxes from six hundred trees.

MR. WAGONSELER: As to the peach plum in my locality, which is about fifty-five miles above here, towards the head of Russian River, I have a good many peach plums planted already, and are profitable to raise, provided we have an outlet. I had somewhat over five tons of them this year, which I dried. Last year I had more and they bore profusely, sometimes they overbear. Since I came here I learned they were good to ship, but being thirty miles from the head of the railroad, this year I dried them for market. The question comes up now whether they will be profitable when we have communication in a year or two with the East.

MR. BUCK: The prices paid for peach plums for the last several years have been from \$1 to \$1 50 a box, the party furnishing a box; that would be from 5 to 7½ cents a pound; that is, for the early ones. That didn't hold true later on; then even the men that bought them doubled their money.

MR. WHITTAKER: This discussion in regard to plums this morning is certainly very interesting to me; it bears out the assertion that I have been making to the fruit growers of this county from year to year, that we certainly have a bright future in this county for plums and table grapes as soon as we can get an outlet for them, which we will have, perhaps, before the next season comes around. We have thousands of acres of land here, along the line of that road, that is as good grape land as there is in the county, well adapted to the growing and cultivation of the table grape, and I say that this discussion is very encouraging to me, and must be to the balance of the fruit growers in the county, and it shows me what we may depend on in the future for our fruits and fruit lands. This peach plum is something that I am not acquainted with, and I would ask if it is a good drying plum. The fruit growers in this county have had great difficulty heretofore to get to market, and when we planted out a variety of fruit we were always very careful to see that it was a good drying fruit, so that it might be sold either green or dry.

MR. WAGONSELER: So far as my experience goes it is a good drying plum. At Ukiah last year I commenced pitting the plum the nineteenth day of July. This year our season was much later and I commenced about the twenty-fifth. The peach plum was the first that I pitted. I had about a ton after it was dried this year. We dried them in the sun. The point with me was whether they were a good plum for shipping, ripening from the middle to the twenty-fifth of July, according to the season. As to grafting them on the peach root, mine are all on the peach root; they take readily in grafting, at least that is my experience.

A DELEGATE: On what kind of soil?

MR. WAGONSELER: First class Russian River soil—some a little gravelly, disposed to be a sandy loam, and other parts of the orchard where it is a little heavy.

MR. HATCH: Where do your trees do best, in the heavier or lighter soil?

MR. WAGONSELER: Varying between the two; I think in the lighter. I am a mile from the river, and still I am close to the mountains, where a good deal of my land has been made from a creek long before we came to this country. I find it spotted, though it is very rich; has been overflowed land many years gone by. But I must say that the peach plum is not an early bearer; I do not think it bears as early and abundantly as many

other varieties. I have peach plum trees that bear heavily there that stood there thirteen years ago, and the last two or three years they bore very heavily.

MR. HATCH: What do you call a good crop of peach plums per tree?

MR. WAGONSELER: Oh, four hundred or five hundred pounds on a tree ten years old.

MR. VEEDER, of Grafton: I understood that the nectarine did not bring a very good price, is that on account of the condition that they arrive in?

MR. HATCH: That is the trouble; they don't get there in the order you ship. It does not carry in good order, if so it would sell.

DRYING AND CANNING FRUIT.

MR. HATCH: In regard to the packing of dried fruit in boxes, the fruit should not be too dry, and it should be packed so as to press the fruit; it will keep better and appear better. It gives it a larger appearance, and makes it show to the best advantage to have it pressed. That is one thing that I have noticed in the dried fruits that many parties ship, that they are loose in boxes; the prunes look about half as large as they would if they were manipulated on the surface, and it adds to the selling price or the goods.

MR. HAYDEN, of San Francisco: It has been about four or five years since last I addressed the Convention on the subject of dried fruit, at the time the session was held in San José. It is a subject that will call for a great deal of attention and discussion; a subject that must be thought of. The questions of drying fruit, what to dry, when to dry, and where to dry, are all questions to deliberate over. The old primitive method of drying fruit, that anything you could not send to the market, anything that the hogs would not eat, would do to dry, is fast passing out of existence; they have not built up the reputation of dried fruits in the State of California upon such fruits as that, but the reputation has been built upon the very best fruits that you can raise. You can raise nothing too good to dry. What you expect to gain from your dried fruit is money, and in order to get the money from the people you must give them a good article. It is not the rich man that buys the ordinary class of dried fruit, and in order to reach him and reach his pocket, you must give him something that he wants; you must give him a nice article dried in a proper manner, and then you will reach that class of trade. I have seen the dried fruit industry grow from about \$1,000 a year in this whole State of California to the present day, and I presume that I can say, although I have not the exact statistics with me, that the dried fruit interest to-day in the State of California amounts to about \$10,000,000, inclusive of raisins. I have bought large quantities of dried fruit this year; I have manufactured large quantities. I have a very moderate sized drier, but I am able to dispose of about twenty-five thousand pounds of green fruit every twenty-four hours, which manages to consume a considerable quantity. In the selection of your fruits to dry, you want to be careful that that fruit is thoroughly matured. You take a green peach, or a green plum, or a green apricot, and you cannot make a good dried fruit from it; the reason is that you cannot get the preservative qualities of the fruit until that fruit has thoroughly matured; when it is thoroughly matured, then it possesses saccharine matter, or grape sugar, which is a preservative quality to preserve the fruit. You take a green piece of fruit and attempt to dry it, and when it is dried

it is worthless; and as an exemplification, I might say that if you take poor, miserable, green fruit that is not fit to eat, you do not enhance the quality of that fruit by drying or canning it. The amount of fruit that has been dried up to the present date in the State of California this year, to the best of my ability of computing, has been about two hundred and thirty carloads of dried apricots (that is, in this State), about three hundred and thirty-five carloads of peaches, about sixty-eight carloads of plums (apples I have paid but very little attention to; I have not attempted to find out), and about one hundred and sixty carloads of prunes; that has been about the crop of the State. And when you undertake to figure those articles up, and stop to consider that for every carload of dried peaches or dried apricots you represent about six carloads of green fruit, you find that those will aggregate almost six thousand tons of green fruit. It is an industry that you have got to pay more attention to than you have paid; you will be able to harvest your crops, you will be able to dispose of some of them for market, you will be able to ship some of them East, you will be able to sell some of them to your local canneries, but a great portion you will be obliged to dry.

Now, then, in preparing your fruit for drying, it is very simple for every man to try and make good fruit; but the difference in fruit is just the same as the difference in butter. You can find twenty or forty different ranches; out of the forty probably ten will make good butter, and ten medium butter, and twenty very poor butter. It is just the same with dried fruit, but there is no reason, if you will only take care in picking the fruit, to see that it is not bruised, why you should not make good dried fruit. A person will take up a piece of dried fruit and notice a black spot, and not know what to make of it—it either fell from the tree, or was bruised in picking or in handling, or in transmission from one place to the other—and just as soon as that fruit is bruised, just so certain oxidation commences to take place, and when it takes place that fruit will spoil; that fruit is bound to spoil, and it will be spoiled when it is dry. Now, then, if you will be careful in picking your fruit and handle your fruit properly, and when you are prepared to dry your fruit if you will submit it to a little sulphur process, in order to preserve the color, then you will be able to get a product that will be savory. There are questions, of course, pro and con, in regard to the effects of the sulphur. My experience in the matter of sulphuring fruit has been considerable, and it is because it is a thing that is not thoroughly understood. When the fruit is picked and cut with the knife, if that fruit is placed upon a tray and submitted to sulphuring for a period of twenty to twenty-five minutes, it will have this effect upon the fruit: it will prevent oxidation (oxidation is decomposition); it will prevent the fruit from decomposing before the sun, or hot air, or whatever process you make use of to dry that fruit, takes effect. It will prevent oxidation, and that is what we want.

What we want in placing our fruits in the Eastern States is to present to them a product that they will want; and what they want is a bright, palatable looking fruit, and it can be very easily made bright and palatable by this simple sulphur process. It does not injure the fruit; I am prepared to stand here and argue with any one in regard to that particular point. I will tell you why it does not injure the fruit: the action of the sulphuric air or gas, which is made by the burning of the sulphur, closes the pores of the fruit and prevents the excretion, and when that fruit is then put in the drier, or put in the sun to dry, the excretion being checked, drying commences to take place almost immediately, and hence there is no chance for decomposition. That is all the sulphur does, and at the

expiration of an hour, or two, or three hours, the effects of that sulphur has entirely passed away, either by the process of heating or by the process of drying in the sun. It does not affect the fruit; it does not penetrate, only the outer coating of the fruit, hence I say that it is not injurious.

A great many apples were dried in the early days, before we understood the entire process, and the process of bleaching, as they called it, of the apples was done by placing the sulphur upon the furnaces and thereby forcing the sulphuric air or gas into the fruit as fast as the cells of the fruit were opened and the evaporation took place; then it did penetrate; but in the modern process of sulphuring, immediately after cutting with the knife, placing it in a box and sulphuring it then, and afterwards submitting it to your drier or to the sun, the effect of the sulphur has entirely passed away, and you will not injure your fruit at all. I suppose that some of the gentlemen would like to know some of the kinds of fruit that would be best to dry. I might say in regard to that, I had perhaps hundreds of peaches. I presume that one of the best drying peaches that we have had is the Muir; another very fine variety is the Salway, a very fine drier because they dry heavy, and that is one of the principal advantages in drying fruit. Apricots, the Moorpark is the best drier—that is, the heaviest drier and the most profitable; and then the Hemskirk, and we come down to the Royal. The Royal is a very good drier, unless it be from the Sacramento River; from there they don't dry very well, because they dry almost to pieces; but the Moorparks are very good, and the Vacaville Royals are very good. The Imperial apricots dry good, but along the river they are quite moist. Of the plum varieties there are a number, the Egg plum, Coes, Golden Drop, Columbia, Washington, and all those varieties; the Peach plum is a good variety.

A DELEGATE: How about clingstone peaches to dry?

MR. HAYDEN: The clingstone peach is a very good peach to dry, but a great trouble is getting the pit out.

MR. HATCH: I have had occasion this year to dry a good many clingstone peaches. We found that we could get the pits out and have more peach left than we could with the freestone of the same size.

MR. HAYDEN: I will say in that connection that it is the more profitable to dry, if you only have the patience to get the pit out; it is more profitable, the meat is firmer and possesses better qualities when the peach is all dried than other varieties. The Early Crawford is a very fine peach to eat, but a very poor drier. It will take almost seven and one half pounds of Early Crawford peaches to make one of dried.

MR. WAGONSELER: At about what stage would you dry the plum?

MR. HAYDEN: In regard to that I would use the same expression I did as regards the peach. You want to take a peach when it is mature, when it has got a good full color; the same with all kinds of fruit, they want to be full colored, but they do not want to be soft. I have been in a section this year where I have seen a hundred thousand pieces of lumber spread with peaches, and I am prepared to say that 10 per cent of them were wasted. They had gone to work and allowed their peaches to get too ripe, and the fiber was gone, and the peaches were spread right out there, and they dried as black as your hat. It is impossible to do anything with that kind of fruit, and I want to make a suggestion here. It is the old adage of penny wise and pound foolish, to endeavor to save that kind of fruit; you can't save it; it does not produce a profit to you, or to anybody else. When fruit gets too ripe, don't try to cut it, but go out and get that which is just ripe, and save that, and let that which is too ripe go, and let the

hogs feed on it; but don't waste your time and waste your labor in trying to dry something that, when it is dried, will not bring you anything.

MR. HATCH: One gentleman had a good many peaches come to the ground ripe, and he did get pretty good paying prices, better than if he had made pork of them.

MR. HAYDEN: What I had reference to in overripe fruit is this: You take a peach and hold it in your hand and shake it and the skin will come right off; that is too ripe to dry. They may fall to the ground and you can pick them up and dry them, but when you take a peach where the skin is ready to drop off, it is too ripe; there is no fiber to the fruit, and when that fruit is dry it is not salable, it is not fruit that would be palatable, and what we are looking for is a product that will bring us money. I told you four or five years ago in the Convention that you could not raise dried fruit enough, that we were ready to take it all, and haven't I fulfilled that statement? Haven't we for the last few years taken all that you could give us? I am not speaking of myself individually, but of the dried fruit interest. The dried fruit interest has taken all your dried fruit, and of the last year's crop there is very little in San Francisco to-day, and about all the fruit there is in the State is there. We have placed it in the eastern market; there is where it goes to, and in order to place it there you must give them the product they want; you must give them a good article.

MR. TOMPKINS: What do you consider the best temperature to dry fruit at to get the greatest weight and best fruit in the evaporator?

MR. HAYDEN: My idea of the evaporator is somewhat different from the ordinary theory. The temperature to which I subject the green fruit is about 240°; I allow the fruit to remain in that temperature for a period of from twenty to thirty minutes, according to the size of the fruit, and then it is taken from there and raised up and finished at a temperature of about 135°, but for sun drying, I think that an even temperature from 100° to 115° is the best temperature for the drying of fruit in the sun. It is better than where it is too hot or where it is much colder.

MR. TOMPKINS: Is the theory correct that the evaporator starting at a high temperature destroys the germs, and then to dry it at 135° or 140° it will weigh heavier than the sun-dried fruit?

MR. HAYDEN: I claim it is, for this reason: After the fruit has been evaporated about 50 per cent in my drier, then I take it from my drier and put it into what I call a hot-room, where there is a temperature from about 130° to 135°. Now, what I claim by the transferring of that from the drier to the hot-room is this: that what remains in that fruit after having been transferred from the drier to the hot-room is a syrup or saccharine matter, which is a preservative quality that is crystallized into the fruit instead of being dried out of the fruit.

MR. TOMPKINS: That is just exactly what I have always thought, though I have not had very much experience in the matter; that if you want to get the best product you must use the evaporators in that way, instead of letting the sun and wind dry it all out.

MR. HAYDEN: That has been my experience in this business, and I am quite conversant with it. Many of the larger fruit growers in the State when they come to San Francisco come in to see me, and that is my principle of drier. I have none for sale, it is one built for my own use, and I am always pleased to see those interested in the dried fruit business. I am a manufacturer and dealer in dried fruit, and I have made it a study. There are lots of things that I don't know, and I presume there are a few things that I do know in regard to it; but I am always glad to learn more. That has been my theory with dried fruit; that after you have submitted

it to a high temperature for a short length of time—for instance, when I dry apricots in four hours from the time the green apricot is put into my drier it is ready to go into my hot-room, and there it remains for fifteen to twenty-four hours, according to the size of the fruit, and then it is thoroughly done; then you can take a piece of the fruit that I dry and cut it open, or open like that, and it looks as if it were a glutinous substance, a perfect jelly—that is what I claim by my process, instead of drying out the moisture in the fruit it crystallizes that into the fruit and makes a preservative quality out of what a good many send out of the chimney.

A DELEGATE: You think fruit will preserve better starting at 220° than at 170°?

MR. HAYDEN: I will give you my reasons. It is necessary for me to push along the business and dry as rapidly as possible, and I claim that for a period of twenty or thirty minutes in that hot air I evaporate from 10 to 12½ per cent of the evaporation. I force it, but I do not allow it to stay there long enough to destroy the fiber of the fruit, but I make quick and rapid evaporation for the first half hour, and then I gradually taper the heat off. The upper portion of my drier is only 180° when the lower portion is 240°.

MR. STABLER: In conversation some two or three years ago with one of the most intelligent fruit growers of the State, I was informed that he, as an experiment, once went to an orchard on the lowest bottom river land in the neighborhood and got a given number of pounds of apricots and then he went to a piece of land higher and thoroughly drained, and he dried the two products and found that the proceeds were two to one in favor of the highland fruit. That seemed to me to be very remarkable, and if the gentleman has any knowledge on that subject I would like to know whether there is that much difference between fruit grown on very wet land and fruit grown on land that is dried thoroughly by underdrainage.

MR. HAYDEN: The only way that I can answer that question is to say that inland fruit is more profitable for us to dry than fruit that is grown along the Sacramento River; I would sooner pay a quarter of a cent more for Vacaville apricots than I would for river, because there is that much difference in my favor.

MR. TOMPKINS: How is it with Fresno and Kern?

MR. HAYDEN: A very few of them come to this city. The only thing that I can speak of is that I was on a visit there; it seemed that they yielded well, and dried well, and dried very heavy.

MR. BUTLER: What is your process for removing the peel of your peaches?

MR. HAYDEN: I use alkali. I take from ten to fifteen pounds of peaches and put them in a wire basket and immerse them in the strong lye, boiling hot, and then I put them into cold water, and the peel comes off very readily. I keep them immersed only about half a second, just dip it down and dip it out, the same as you dip prunes exactly; then the peeling will come off. They take it off with rubber gloves.

MR. HATCH: You leave it in there a little bit longer and then put it in cold water, and you can take it off without any hand work.

MR. HAYDEN: I have been afraid the lye is too strong and would affect the meat of the peach. There is another thing that I would say in this connection. I will give you my idea: When you take that peach and put it right into sulphur, just as it is, and then you take them out and pit them, and then I have submitted them a second time to the sulphur, and in that way I prevent oxidation and keep the peach perfect, and keep its color, and it is a much better way than the old process of peeling by machinery.

A DELEGATE: After you immerse them in the lye, do you reimmerse them in hot or cold water?

MR. HAYDEN: Cold water. I have four cold waters, that is, I give them four cold water baths in order to dissolve the lye.

MR. BUTLER: Each immediately succeeding the other?

MR. HAYDEN: Yes, sir.

A DELEGATE: What lye do you use?

MR. HAYDEN: Concentrated. I use two pounds to one gallon of water.

A DELEGATE: Did you ever try boiling water alone without the alkali?

MR. HAYDEN: I have tried water. It can be done.

MR. STABLER: A gentleman said that it is better without lye.

MR. HAYDEN: If we are doing it for home use it is a different thing, but where I am using such quantities it is necessary for me to be expeditious, and that is why I use such a strong lye.

MR. HATCH: Do you get the peeling off without any handling in hot water?

MR. STABLER: No, you have to put it in cold water.

MR. BUCK: I am much pleased with what the gentleman has said; he has touched one of the coming interests for the fruit business of this State. This is the first year that we have ever had any large quantities of good dried fruit to sell, that is, in different varieties; but this year there has been a very large amount of good fruit dried all over the State. I believe the time is not far distant when the dried fruit product, including raisins, will be the predominating interest in this State. It will produce to this State more money than any other interest in the State. We can make in this State a product of dried fruit, especially of the tree fruit, that no other section of the United States can begin to compare with it. Two years ago, while I was East, I took a good deal of pains to see and examine some of the best dried fruit that I could find from the Delaware and Maryland evaporators, and also large quantities of dried peaches shipped from the section that has in years past supplied the most of the dried peaches, which is the northern part of Georgia, North and South Carolina, and Tennessee. Those States have furnished the dried peaches for the United States for years, and they are nothing but scraps as compared with our dried peaches; in fact, they are mostly cut from four to eight pieces to the peach, and then they dry away very much more than our fruit does. I saw in only a few places what would be a fair article for California dried peaches, from Delaware or below there, and there were none of them more than half the weight that you can find in any store in California where you find peeled dried peaches for sale. Now, as has been said, we have heretofore dried our refuse, but we have now got to dry a portion of the best of our products, and in order to keep a market for that product it wants to be well sorted—as well sorted in the drying as in the shipping. If you have any poor dried fruit put it by itself and put your own individual brand on the good fruit, and I do not believe that there is an acre of good fruit land in bearing of peaches, apricots, or plums, that will not produce \$100 per acre, and dry the entire product. As he has said, I believe the fruit from Vacaville will produce more pounds of dried fruit than any other section of the State. Perhaps many others are just as good, but it is one of the best for the same number of pounds per tree, and I believe that we can make our fruits worth from a cent and a half to two cents a pound at home by drying it in good shape; and I believe one of the things that all the fruit growers of the State should prepare themselves to do, instead of being forced to San Francisco, and at half a cent to a cent a pound, to prepare to dry

their fruit and force the buyers to pay what I believe they can pay—about two cents a pound for the fruit.

MR. TOMPKINS: I would like to know how you keep the worm out of the dried fruit after it is evaporated?

MR. HAYDEN: I will tell you in regard to that: I have got a superheater, and I use superheated steam, which is dried steam—steam which is made and then dried—and I submit them to that for five minutes under a heat of 270°. It softens the fruit, gives me an opportunity to pack the fruit, and at the same time it kills all worms, germs, larvæ, or anything else that may possibly be there, and I guarantee the fruit will keep for any length of time, so far as the worms are concerned, unless they put it inside of the fruit.

MR. TOMPKINS: In what shape do you put it in?

MR. HAYDEN: I put it in right on the tray.

Here recess was taken until half-past one o'clock.

AFTERNOON SESSION.

MR. COOPER: By special arrangements the subject of "Forestry" comes up before the Convention the first thing this afternoon, and before bringing the matter before you I will read a few lines from my opening address: "Forest culture, in relation to fruit, also has your attention. I refer you to the very able and interesting essay by Abbot Kinney, pages 118 to 127 of the biennial report. It is a question whether fruit growing in many parts of the State can be made a success without the planting of forest trees for their protection." I believe that this theory has been admitted by all intelligent horticulturists in every part of the world: that forest trees are a necessary part of successful fruit growing. From my own experience on my own ranch, I am satisfied that I can grow better fruit and more of it, with less trouble, by having one quarter of the area in forest trees and three quarters in fruit trees than I could if the whole were in fruit trees.

OUR FORESTS.

THEIR DESTRUCTION AND ITS DANGERS.

Essay by ABBOT KINNEY, Pasadena.

The lines of beauty in a building are the lines indicating appropriateness to use; the lines of beauty in man are the lines of strength, and the lines of beauty in woman are the lines indicating reproductive power. Thus the admiration of mankind is ever directed, in a healthy society, to the useful and the necessary. Amongst Americans there is a nearly universal love for trees, thickets, and for the forest. From analogy we must infer that this love and admiration for trees is based on truth, and arises from the use and necessity of the forests to mankind. The emotional side of the forest question should therefore not be despised. Nearly every respectable person dislikes to see a tree cut down or a forest burned by the ruthless fire, but people cannot always give a reason for their sentiments. The City Park, which is an imitation of nature's glades, and the National Parks at the Yellowstone and Yosemite, which are preservations of nature for the delight of the people, are the result of this sentiment for the forest.

Our churches of Gothic architecture are intended to imitate in their pillars and arches the lines of the forest. In primitive times religion was still more friendly to the trees, for the holy places of our ancestors were the consecrated groves of the Teutons, and the Sacred Oaks of the Druids.

In education also, the woodland plays a part. The brilliant intellectual period of Greece had its schools in groves. To this day the Greek word for grove, "Academy," has come down to us as a name for a place of learning.

The emotional side of a question, however, is not enough; it is the practical that governs the world, and it is from this side that the forestry question must be approached, if permanent results are to be achieved.

The first business thought of a practical person in looking at a forest is, what are its products worth? That is, what can be made out of it? For the products of the forest enter into the life of every one. The varnish of the artist, the rubber, the gums, the resins of commerce, the barks of the tanner, the corks of the vintner, the handles of our tools, hoes, plows, etc., our dye stuffs, our wagons, the ties and cars of our railroads, fences and telegraph poles, furniture, wharves, boats, ships, and, in America, even the houses we live in, are largely the product of the forest. Few people appreciate what the annual drain on our forests is; even such small things as matches consume great amounts of lumber every year; charcoal and fuel are a great drain on our forests; even coal is but a fossilized form of wood. Nuts, fruit, and medicines, such as cocaine, quinine, etc., cannot be overlooked. When we then consider the products of the forest, it will not be a surprise to learn that they were estimated in the United States for the year 1886 at \$800,000,000. The last Government statistics at my command show some of our principal crops to have been:

Wheat	\$174,291,850 00
Cotton	280,266,242 00
Gold and silver.....	74,400,000 00
Coal.....	94,500,000 00
Iron ore.....	20,470,000 00

It will thus be seen that the economic value of our forest products is nearly double that of wheat, more than ten times that of gold and silver, and forty times that of iron ore. The census, the agricultural reports, the recorded observations of intelligent men, as well as the individual experience of every one who has by travel become acquainted with the country, show that the consumption and destruction of our forests now so far outruns their reproductive capacity, that at the present rate in a few years we will have no forests at all, and their vast crop, valued at \$800,000,000 a year, must disappear from our census books. We are eating into our capital and providing for no renewal of it. It is not alone the good lumber and firewood taken that we must calculate on, but the waste that accompanies it, and the destruction annually caused by fire. These the best authorities state to be even greater than the drains of commerce.

Forest fires destroy every year millions of this the people's property, and blacken and mar the landscape. Besides, the lumbermen, in the prosecution of their business, waste fully as much timber as they use. In my visits to Mendocino County, and other centers of lumbering activity in this State, I have seen left to rot or burn large portions of the trees felled, and again and again I have seen magnificent trees felled and left untouched, because they did not fall right, or for some other trifling reason. In this way much lumber is wasted, and firewood enough is annually destroyed to supply the whole of California for years.

Besides the waste, this debris in the oft occurring fires makes an intense flame and heat, endangering all contiguous forests, and destroying, often entirely, and always much, of the wood they traverse; and also the humus in and above the earth. In this connection, it may be well to say to those having lands to clear, that it has now been demonstrated thoroughly that burning over land destroys the best part of the soil, and thus permanently injures its producing capacity. The hotter the fire, the deeper it destroys the soil. Experiments in Canada show that a hundred years of repose and forest action will often not reestablish the strength and fertility of the soil passed over by hot fires.

Besides the regular lumbermen who operate on a large scale, there are numbers of individuals engaged in making shakes, etc., who use only selected trees, chiefly the sugar pine, which in this State reaches a great size, is very valuable, but does not readily reproduce itself. To be advantageously used, these trees must be in certain conditions, which can only be told after they are felled. Thus thousands of trees, and of the very best, are annually felled and found unsuitable, and left to rot. At the best, these men only use about twenty feet of the magnificent trees they cut, the rest being waste. The sugar pine is fast disappearing. The tanbark men also destroy great numbers of trees, taking only the bark. I have seen in this State, in one place, woodmen destroying trees, cutting off only the branches for firewood, and leaving the trunk and bark unused; in other places, lumbermen leaving the branches and firewood, and taking only the trunks; again, tanbark men leaving the entire trees, using only the bark. It may not be a crime to allow such unnecessary waste, but it is unmitigated folly to be thus throwing right and left a property that brings us in \$800,000,000 a year.

The forests are also much injured by sheep and goats that are driven into them for a few weeks' pasturage; these destroy the young trees and pack the ground so that it cannot so well receive and hold moisture. Besides this the shepherds frequently deliberately set fires to open the country, or as they say, to improve the pasture, thus often destroying in one season more lumber, firewood, etc., than the value of all the sheep and goats and their products that have or ever will visit the scant mountain pastures.

Every considerable government of Europe now has its Forestry Department. Every one of them gives a net revenue. The system pursued is nearly the same in all. By it the forests are preserved and increased in area at the same time, the maximum of firewood and lumber consistent with this preservation is taken out, and no waste is allowed.

The revenues from these departments show that a large properly managed forest is a source of income.

Saxony has a net annual income of \$3 25 from each acre in her total forest area. Alsace-Lorraine, about the same. British India, although a new convert, and under heavy expenses, had, according to the last returns in my hands, a net income from her forest lands of over \$1,000,000.

All the European Governments, save England, which is exceptionally situated, have Forest Departments served by men instructed in Forest Schools, some of which are celebrated; such as those at Hanover, Aschaffenberg, Minden, and Nancy, each department giving more or less net revenue. In Austria, Italy, and France, considerable work in forest planting, from which little or no direct revenue can be expected, is being done.

Such desolate places as the Karst in Austria and the Landes in France are thus being reclaimed. Trees are also being extensively planted on the watersheds of rivers and torrents. In the first case the object is to

reestablish regularity of flow in the streams; and in the second, by preventing the rapid delivery of heavy rains from bare surfaces, to reduce and eventually end the destructive action of torrents that at present alternate between being beds of bowlders or glittering wastes of sand, and rushing full of turbulent water charged with mountain debris, and carrying destruction in their course to the valley lands. These works of the foresters are productive to the nation, but show no revenue to their department, which is a fact that must be taken into consideration in the economic management of forests. Some of these works have even become remunerative. The fine plantations on the southwest coast of France about Arcachon, to reclaim the desolate Landes, are of these. In that section the sand dunes of the coast were rapidly advancing on the interior in hills over two hundred feet high; fields, houses, villages, and even church steeples, were entirely buried out of sight.

Major F. Bailey, R.E., in a recent trip to the Landes, speaks of his guide tying his horse to the projecting point of one of those covered church steeples.

The planting of these forests near the coast, together with the preliminary work necessary to establish their growth and stop the rolling sands, costs the French Government about \$40 per acre. Tracts in these forests are now rented for five years, with the privilege of cutting selected trees, and tapping others for resin, at a price equaling about \$70 per acre. It will thus be seen that under even adverse circumstances, a scientific forest management designed for protection to a country, rather than for a direct profit, may be made remunerative.

In California a number of small tree plantations have been made, and I believe with very satisfactory results. Several small groves of locust trees have been reported as having proved profitable, the wood being sold for wagons, etc. The only figures I am able to give, however, apply to plantations of the Eucalyptus globulus. One case is that of Mr. Robert C. E. Stearns, of Berkeley, who reports on a plantation of General Stratton, made in 1869, twenty acres were cut when eleven years old, every item of expense was noted, and a rental of \$5 per year was charged for the land. The net returns on the twenty acres were \$3,866. Another case is that of Mr. George A. Nadeau, of Los Angeles. His figures are:

Cost of trees at time of setting, per acre	\$7 50
Labor of replanting, per acre	5 00
Cultivation, per acre	5 00
Rental of land for seven years at \$3 per acre	21 00
Expense for seven years, total per acre	38 50
Income: Thirty-five cords of firewood per acre, at \$3 per cord in the tree	105 00
The totals finally footed show total expense on tract	3,734 50
Total return	10,185 00
Net profits	6,450 50

California experience shows that tree planting is profitable within reasonable periods, and gives returns as soon as some orchards, while requiring less care and less first cost.

From these points it will be clear that looking at the forest in the most common place and most narrow practical view, a scientific management of our forests is both advisable and necessary. Without this, the immense crop of the forests must disappear, to the great detriment of the country.

While these considerations would doubtless be deemed fully sufficient to a business man to warrant a change in our forest policy, looking to the preservation of the woods from waste and fire and the maintenance of their natural reproduction to replace the legitimate demand of trade, there are

still other reasons of more pressing force which demand forest preservation.

These are the sanitary and climatic influence of forests, and still more their effect on the agricultural productiveness of the country through the precipitation and distribution of moisture controlled by them, and their importance in equalizing the flow of streams and in maintaining springs.

The sanitary influence of forests is well understood by investigators. It will be well, however, to give a few illustrations on this point.

The Roman Campagna in ancient times was covered with woods and groves; from it sprang one of the hardiest and most forcible races of the world. We must therefore infer that it was a healthy locality. Since the clearing of this district, and through modern times, the Campagna has been one of the most deadly miasmatic regions of Europe. Within recent years considerable plantations of trees have been made upon its desolate wastes. One of the largest of these was made upon the Colonna estate, near Civita Vecchia. The trees were principally eucalyptus. The amelioration in the health of the locality was prompt, whereas laborers only remained on the estates in the day, and departed to safe places at night, losing much time in traversing the long distance between their work and their shelter. After the growth of the trees, they were able to remain with immunity in the district itself.

Another plantation on the Campagna was made by the priests at the grand church of St. Paul. The benefit to the health of the fathers was in this case equally marked, the malarial fevers have become less frequent and less deadly. The island of Cypress was formerly celebrated for its luxury and refinement. It contained a large population, and was at that time, at least in its mountainous parts, covered with forests. It has been cleared, and is now a desolate island of bare rocks, with a few cultivated valleys. It is subject to virulent forms of malarial disease, and contains not a hundredth part of its former population, and none of its prosperity. Since the English occupation, forest plantations have been commenced on a large scale, but it is too soon to know what their effect will be.

The shores of the Mediterranean contain numerous instances similar to these. The island of Mauritius is still another, but we do not have to leave our own country to prove this count. The records of the huntsmen and adventurers who first traveled the wooded Western States of America make no mention of malaria as a dreaded malady. The record changed when the settlers came; these cut the trees, and it was then, and only then, that malaria became the scourge to humanity that it is in parts of the Western States. While this evidence cannot be held as conclusive, still its confirmation in every day experience strengthens it. The planting even of belts of trees in malarial districts protects localities previously subject to malarial influences. It must be understood, also, in this connection, that the clearings in the Western States were a necessity, malaria or no malaria.

Many diseases common in open countries are rare or absent in wooded ones, even where considerable village population exists, as in the Black forest of Germany. The death rate in the communities of the Black forest is lower than that of any other part of Germany. Consumption is the disease which, amongst civilized nations, counts the greatest number of victims. In forests this dreadful malady is practically unknown. This fact is now so well recognized by medical men that they send their patients, even in a climate like that of central New York, to the Adirondack woods as a cure, to remain not only in summer, but in winter also.

The beneficial effects of the pine forests at Arcachon, in France, and in our Southern States, have been much availed of in phthisis.

Woods are the best of places for diseases of the eye.

Fog, it is now known by a number of well regulated experiments, is impossible without dust of some kind in the air. In this connection, it may be well to call attention to the explanation of our coast fog. In summer the upper currents of air are from the coast to the sea. These are charged with dust, which gradually drops out of them as they lose force on leaving the land. This dust falls into the sea atmosphere, which is charged with moisture, and fog is the result. Fog is irritating to those with weak or defective lungs. In forests this dust, with moisture surrounding it, is sifted out by the foliage, and fogs in forests are always modified, and if the exposure be favorable, are entirely eliminated. Fogs do not occur in dense forests.

Trees all have some odor, and many a balsamic and agreeable one. Of such trees, the pines, firs, cedars, and laurels, bay and camphor trees are the best known. The emanations from these have in general a sedative effect upon the nervous system, but a stimulating one on the vital functions. They are health-giving to the human being, and to an equal degree they are fatal to germ life, and noxious to insects. The importance of their effect will be recognized when we reflect that many diseases are caused and transmitted by germs, and that these germs are carried and spread by insects, such as flies and mosquitoes. Insects will not congregate upon pitch, camphor, myrrh, etc., and burning of these and many other tree products, as the leaves of pine or eucalyptus, stupifies and kills insects and germs. Some vegetable products, as Pyrethrium, are more noted and deadly than others.

The philosophy of the attraction that pleasing odors have for man is well worthy of study. The taste or instinct for them is as useful as its complement, the dislike of bad smells which enables us to avoid infected places.

In the trees the sap mounts from the roots in a crude state, composed of water (oxygen and hydrogen) and a slight admixture of earthy salts; it is carried to the leaf, when it is elaborated by the chlorophyl, or minute grains that give the leaves their green color; when carbonic acid is absorbed from the air, and oxygen is liberated from the sap and decomposition of the carbonic acid. Carbonic acid has a debilitating effect on man, this the tree absorbs, while oxygen is man's life, and this the tree gives.

Trees, while preservative of moisture in dry situations, have a great drying power when moisture is excessive, as in swamps and malarial lands. Few persons realize what an extraordinary amount of moisture a tree is capable of evaporating into the atmosphere. The evaporation takes place through the stomates of the leaves. Of these mouths ninety thousand have been counted on the lower side of the cherry laurel leaf, which is devoid of stomates on the upper side. On the leaf of the lilac one hundred and sixty thousand have been counted. There is a great diversity in this respect among plants. The only experiment with which I am acquainted, as to what amount of evaporation can take place through leaves of trees, is that of Marshall Vaillant, quoted by J. C. Brown. He took a branch of an oak and placed it in a vase full of water. He measured the water lost through its leaves, and considered himself enabled to conclude that the tree from which this branch had been detached would be emitting into the atmosphere in twenty-four hours upwards of two thousand kilogrammes of water, equal to a little more than five thousand pounds.

The abnormal condition under which this experiment was made must

cause it to be considered as only an indication of what may take place under normal conditions.

A flow of sap from wounds made in trees for commercial purposes, is another indication of this power of taking up water by vegetation. Pine trees tapped for resin, camphor trees for camphor, gum and rubber trees for rubber, show a great flow of sap, but I know of no measure having been taken of it. But measures have been taken of the flow of the sugar maple (*Acer saccharinum*), and the yellow birch (*Betula excelsa*). Emerson cites a maple six feet in diameter that yielded thirty-one and one half gallons of sap in twenty-four hours, and Marsh cites one in Warner, New Hampshire, two and one half feet in diameter, which yielded twenty gallons in eighteen hours. Dr. William cites a large birch tapped in Vermont, the flow of which was measured from time to time for four or five weeks. The sap ran at the rate of five gallons per hour, progressively diminishing. The total yield was estimated at one thousand eight hundred and ninety gallons. The flow from these trees was only from one or two auger holes, and was insufficient to immediately injure the tree.

When we consider the number of trees which thrive on a single acre, we may perceive how important their collective action may become. Trees may drain a soil in still another way. Their roots penetrate into the soil and make permeable strata that would otherwise be impervious to water. The channels made by the roots become a means by which surplus water finds its way into substrata, from which it appears later as springs in lower situations. The life activity of plants produces on the oxygen of the air a condition known as ozone. When in this condition, oxygen is opposed to germ life, and consequently to all forms of putrefaction.

From these points it can be understood why a district is healthier in forests than when it is cleared. The more complete the clearing, the more complete the change. There are other beneficial influences of trees on health, some of which are discussed under another head; such, for instance, as their electrical influences, their equalizing tendency on winds and temperature, and their maintaining effect on springs, whereby wholesome water is secured.

Forest economy is slow in its returns, a new growth of timber requiring many years, which is discouraging to the short lived man. So, also, much of forest land in new countries must be cleared as population increases, whether the result be health or sickness.

But there is a point, variable according to the climate and topography, beyond which the destruction of forests diminishes the capacity of the country to support population, and while at first increasing the arable area, in the end diminishes this through the action of torrents in washing the soil from some places and covering others with sand and bowlders, while at the same time the whole country becomes more exposed to extremes of flood and drought, and the climate more variable and unfavorable to agriculture, the winds stronger, and the springs less reliable and often extinguished.

It is by educating the people to these truths of the effects of excessive and unwise forest destruction, that we must hope to save California from the fate of Palestine, Palmyra, Baalbec, Carthage, Babylon, Greece, Spain, and, in fact, of all the early seats of man's civilization. He who, like myself, has traversed these sometime centers of human prosperity and population, now desolate wastes, the haunts of the hyena and the reptile, must feel that the time has come for this intelligent American people to follow the lead of France, Germany, Austria, and the civilized powers of the world, in averting by timely measures so great a disaster to ourselves.

I shall now briefly set forth the manner in which the beneficial effects of forests in agriculture are produced.

The normal evaporation from bare land is much in excess of that from lands in woods. An experiment made with two jars of equal size, covered with wire gauze to protect them from flies and insects; one set under a bush and the other in a place sixty feet from the surrounding trees, but thus protected from wind, showed the evaporation in the open to be more than double of that under the bush, the exact figures being bush jar, .863 evaporation; jar in the open, 1.854.

Mr. W. Blore, who made this experiment, calculated that in the one hundred and two days of average dry season at the Cape of Good Hope, the excess of the evaporation from a burned or bare district over a bush or forest covered one would be three hundred and eighty-four thousand gallons per acre, or three hundred and eighty-four million gallons for a thousand acres.

Other experiments in England show that the evaporation from an open vessel in a room is eight inches in a year, while in a field or open place it is estimated at between thirty and forty inches. The soil in a forest being protected by the trees to a certain extent as though under cover, we may infer that evaporation would be less under such conditions than in an exposed place. It is a matter of common observation that roads running alternately through woods and open country remain longest moist in the woods. Railroad cuts show the same difference. Houses in forests are damper than those in the open. These facts go to show that evaporation from the soil is slower in a forest than elsewhere. The only exception to this is where water is in excess. The evaporation activity of the trees is then excited to such an extent as to neutralize their productive effect upon the moisture in the soil itself. Thus trees in a swamp have a drawing effect, while upon dry soil they will maintain humidity.

Nothing is better authenticated, both by scientific and general observation, than this last effect. In California we have learned to help the soil and maintain a moisture, by making it a mulch for itself by cultivation. But this artificial process is unprofitable upon the steep mountain sides where our forests are of most importance. Such an attempt would only result in the washing away of what soil there is on the mountains. In this connection it may be well to note the value of thorough cultivation. The dry soil contains 13 per cent of moisture. Schubler's experiments show that soil that weighs about a thousand tons per acre, and thoroughly pulverized and dried, will absorb from the atmosphere in twenty-four hours:

Sandy clay.....	26 tons of water.
Loamy clay.....	30 tons of water.
Stiff clay.....	36 tons of water.
Garden mold.....	45 tons of water.

We are all familiar with the absorptive capacity of common salt. Carbonate of potash has also notable affinity for moisture; but it is the humus of the forest that possesses this power more than any other soil, absorbing to again give off from two to four times its weight in water. Forests mulch the ground under them. It therefore becomes plain that forest fires, when not destructive to the trees, diminish the capacity of the forest for retaining moisture. The trees also protect the earth under them from the heat of the sun. Soil in the open is raised in temperature by the sun, at a depth of one foot, 15° more than in a forest; consequently the abstraction of moisture is correspondingly larger in the open. The difference is one hundred and thirty to one thousand in favor of the forest. On

the other hand the experiments cited by Marsh show that in winter soil has been frozen to a depth of six feet on a bare knoll, while in the adjoining forest it was uniformly above the freezing point. This is most important in California in our high mountains, for rains upon frozen grounds must run off without penetrating. So bare places would not act as reservoirs for later use, while the forested land would. Forests protecting land from excessive heat, protect the snows from rapid melting. The last place from which snow disappears at the same elevation and isothermal line, is the forests. To the irrigators of parts of Central and Southern California this is of great importance: for with the forests the snow water of spring and early summer is long maintained, while without it the melting of the snow must be more sudden, and the water resulting from it flows off in floods to be dissipated when it is most needed.

Another effect of forest action is that the snows in them melt from the ground side most, and thus can reach the conduits that supply the spring, while snow upon frozen ground melts from above and runs off rapidly. The desiccating effect of winds is often great. Our dry winds in this State do much damage to fruit trees, and dry the grain in the milk, diminishing the crop. Forests have a modifying influence upon such winds. In fact, a dry wind cannot originate in a forested country, and as it passes over forests is diminished in intensity; even a belt of trees will have a pronounced protective influence on crops, and trees to leeward of them and for some distance to windward also, for the trees bank up the air on this side, as is known by hunters, who in striking a light place the shelter of their hand on the lee side, having the light in the direction from which the wind comes.

Trees, protecting the ground from the rapid radiation of heat, prevalent in bare places, diminish frosts. Thus a plant under shelter of a tree is less likely to be frozen than if it were in the open. But trees protect in this respect in another way. Megucher's experiments in Lombardy show that trees, like animals, maintain a constant temperature, that is somewhat modified doubtless, as it is in animals, by hibernation. This temperature for trees is 54°. Forests in a country, therefore, have a similar effect to the sea. They maintain a more even degree of humidity and of temperature, and equalize the climate.

The deposit of dew is more copious upon vegetation than it is upon the soil. Experiments show the difference to be more than double. The exact figures are: for grass, 4.75; for a white surface, 2.00.

In walking through grass or bushes after a dew the moisture will be apparent as compared to bare land. Fogs and mists are to a considerable extent condensed by the foliage of bushes and trees, and drips from them to the ground. On misty mornings I have frequently been wet through when walking in the chaparral of the Sierra Madres, while on the bare hillsides no moisture was visible. At Santa Monica, where I spend the summer, on foggy days the trees may be observed to drip with water, and in thick fogs the drip is so continuous as to suggest rain as it drops on the fallen leaves.

The effects of forests on rainfall is not as yet scientifically determined. The total rainfall of the world would perhaps be no less were forests not in existence, but it seems to be that an examination of the subject must lead us to conclude that the distribution of the rainfall is affected by them.

Forests continually operate to equalize temperature. The capacity of the atmosphere to hold moisture varies with the temperature. This capacity doubles with a mean increase of 23.4° between the freezing point and 100° Fahr. Thus in the spring and summer the cooling effects of forests

on temperature must diminish the water-holding power of the air. In walking or riding every one must have noticed the difference in heat between a bare verdureless spot and the shade of trees. This difference is observable even in walking from a dusty road to a grass-covered lawn, thus indicating that the variations of temperature do not depend upon the shade alone. Consequently a current of air saturated for a sandy waste would of necessity, in passing through a forest, part with some of its humidity, owing to the lower temperature. It is from this reason that we see clouds gathering about mountains, when the valleys are under a clear sky.

I have often sat upon the sandy coast of Egypt and watched the sea breeze full of clouds seaward, clear itself on reaching the coast—all the atmosphere over the water fleeced with clouds, while to landward all was sunshine. Our own coast breezes show the same phenomena; the foggy winds of San Francisco soon become the clear breeze of Sacramento, because the temperature of the latter will not permit the moisture to remain condensed.

I have records of many observations of our central States showing that the summer rains are more frequent in wooded districts, and usually follow timber belts and watercourses.

There are also a number of observations on record showing that the electrical effect of trees may play an important part in rainfall. Trees attract electrical discharges, as is known in the case of lightning, and, coupling this fact with an experiment made with a colander so fine that water merely oozed through, from which, on the application of an electrical current, the water poured out of the small apertures, we must conclude that the effect of trees on rainfall through electricity may be considerable.

J. Croumbie Brown even goes so far as to suggest the possibility that trees may manufacture water out of the atmosphere. He says: "The constituents of water are oxygen and hydrogen; the constituents of ammonia are nitrogen and hydrogen; the constituents of carbonic acid are carbon and oxygen; and the principal constituents of atmosphere are air, and nitrogen, and oxygen; with these is combined or intermixed carbonic acid. Carbonic acid and ammonia are likely to be absorbed largely by water, and so carried into the plant. Carbon is fixed, being the principal constituent of wood, and thus oxygen is set free. A smaller quantity of nitrogen is fixed, but enough to indicate a decomposition of ammonia to have taken place; and it is not reasonable to suppose that all the ammonia taken up by the plant may have been decomposed; the nitrogen combining with oxygen, set free by the decomposition of the carbonic acid, yielding material for the woody structure and appearing as atmospheric air, and the hydrogen combining with oxygen and forming water."

The same suggestion has been made by others in regard to insects, such as the white ant of Africa, the cuckoo spit, etc., which secrete large amounts of moisture in places without water.

Whatever the effects of forests may be on the amount of rainfall, it is beyond doubt that their influence on its delivery is of the first importance.

Trees offer innumerable obstacles to the running off of rain. Their foliage obstructs the force of the rainfall; when this reaches the ground, it is impeded by the fallen twigs, and leaves, and the humus, by which it is rapidly absorbed and held as in a sponge. The roots, at least when decayed, form channels into the lower soil. These impediments cause the water to flow very slowly, and prevent it from gullyng out the land and forming accumulative channels. Thus the rain has time to sink into the earth, and to replenish the subterranean reservoirs of the springs. The waters percolating out of forests never carry earth in them, as in the case of lands denuded

of vegetation. The rate of delivery of a given rainfall from a wooded watershed is much slower, and is much longer continued, than from a bare one. The importance of this will be understood when we recall the French experiments at St. Phalaz. At that place there are two watersheds of nearly equal area and inclination; the one wooded, the other not. From the first proceeds a nearly perennial stream; from the other, a dry gully. The period of delivery of flood waters in the first is five days, while in the second the period is only six hours, and it is but fair to presume from the stream in the wooded one, that it is a delivery of water that months before fell in rain, which amount of water, falling upon the other watershed, augmented its flood.

The first of these watersheds causes no destruction to the roads, nor extensive erosions of the banks of the stream; while the flood from the other washes away the bridges, destroys the roads, and rolls gravel and boulders into the valley.

Supposing ten billion gallons of water to fall within a given time upon each of these watersheds, from the first the delivery will extend over a period of five days, or one hundred and twenty hours, some of it being permanently retained to supply the springs and stream; while from the other the ten billion gallons will flow off in six hours, with scarcely any absorption into the soil itself; consequently the delivery of water during a given moment during the flood must be twenty times greater in the denuded ravine. Every second of prolongation of water delivery diminishes its height, force, and danger.

It is from denuded and mountainous watersheds that torrents are formed. The undetained waters rapidly form channels and erode the land, carrying earth, sand, gravel, and boulders in their flow. As the inclination of watersheds diminishes, the debris is dropped—first the boulders, then the gravel, then the sand, and last the earth and clay.

Standing upon the dikes of the Talfer Torrent at Botzen, in the Austrian Alps, I observed the dry bed of the stream to be on a level with the roofs of the three-story houses at Schlanders, Kortsch, and Lais. The church steeples are lower than the bed of the Gadribach. The watersheds of the Durance, in France, were formerly wooded, as we know by the records of the lumbering corporations that operated upon it. For years it has been denuded, and the river now varies from a vast dry bed of pebbles and sand to a furious torrent. It has covered more than two hundred thousand acres of one of the formerly most fertile valleys of the province.

In Southern California the same causes are already producing the same results. Fires have been set, and are being set accidentally, largely by sheepmen, which burn the brush and forest and prevent new growth. New torrents in unexpected places have formed, and the old channels, such as the Tejuaga, Santa Clara, San Gabriel, etc., are more subject to floods than formerly with the same rainfall.

When we contemplate what has happened in other countries, we cannot but perceive that the mining debris of our central valleys is nothing to what must be expected from torrential action from such a chain of mountains as the Sierra Nevada with its easily disintegrated formation, should it be denuded of vegetation and the snows be unprotected and the rains undetained.

The principal sources of danger to be anticipated in this direction are the fires which annually do more and more damage, and the over pasturage of the mountains which tax the earth, destroys the humus, and, through the hunger of the half-starved sheep, causes the destruction of the natural reproductive power of forests, by reason of the eating by these of the grow-

ing plants. As has been said and cannot be doubted, the sheepmen in our mountains do every year a hundred times more damage to the lumber, to the streams and springs, and to the retentive power of the watersheds, than the scanty mountain pastures are worth. Sheep pasturage should be regulated as it is in Europe, and confined to forest tracts with such limitations as the condition of the forest requires. In this way the mountain pastures should carry no sheep then; now, under the present system, both forests and pastures are being destroyed.

The secondary effect of denudation of mountains and the formation torrents is the diminution of springs and streams in their summer flow. The rains rushing off rapidly have no time to sink into the subterranean reservoirs, and consequently the springs must fail. In his celebrated work on the earth as modified by man, George Marsh says:

As the forests are destroyed, the springs which flow from the woods, and consequently the greater watercourses fed by them, diminish both in number and in volume. This fact is so familiar throughout the American States and British provinces, that there are few old residents who are not able to testify to its truth, as a matter of personal observation. * * * I remember one case where a small mountain spring, which disappeared soon after the clearing of the ground where it rose, was recovered about twenty years ago by simply allowing the bushes and young trees to grow on a rocky knoll immediately above the spring. * * * The hills in the Atlantic States formerly abounded in springs and brooks, but in many parts of these States, which have been cleared, the hill pastures now suffer severely from drought, and in dry seasons furnish to cattle neither pasture nor water.

Marchand cites the following instances:

When the factory of St. Ursanne was established, the river that furnished its power was abundant, and had from time immemorial sufficed for the machinery of a previous factory. Afterwards the woods were cut near its sources. The supply of water fell off in consequence, the factory wanted water for half the year, and was at last obliged to stop altogether.

The spring of Combefoulat, in the commune of Seleate, was one of the best known in the country. It was remarkably abundant in the severest droughts. Consequent upon the cutting of the wood at its source, this famous spring has become a mere thread of water, and in times of drought disappears altogether.

The spring of Variéux, which formerly supplied the castle of Pruntrut, lost more than half its waters after the clearing of Variéux and Rongeoles.

The Dog Spring, between Pruntrut and Bressancourt, has entirely vanished since the surrounding forest grounds were brought under cultivation.

He also cites the case of the remarkable Wolf Spring, in the commune of Soubry, ninety years ago. The location of this spring was a bare, steep pasture, inclining to the south. Only after the heaviest rains was a small thread of water observed. The pasture was turned into a woodland, when a fine spring appeared, furnishing abundant water in the longest droughts.

For fifty years the Wolf Spring was considered the best in the Clos du Doubs. A few years since the wood was felled, and the land turned to pasture again. The spring disappeared.

Edgar T. Ensign, President of the Colorado State Forestry Association, writes me that consequent upon the destruction of the forests on the east side of Cheyenne Mountain, the perennial character of the springs in that locality has been nearly destroyed. Humboldt, Dr. Piper, W. C. Bryant, Boussingault, Phipps, Becquerel, Cantegril, Surrell, Cezanne, and, in fact, nearly all persons who have given attention to forestry, cite similar facts.

In New York, the diminished flow of the Hudson and of the feeders of the Erie Canal, since the destruction of the woods at the sources of these streams, has caused the State to withdraw all its forest lands from market, to buy other forest lands, and to establish a forestry commission.

Colonel H. H. Markham, Congressman from Southern California, who introduced the Forestry Bill, prepared by the California Board, into the last Congress, in a letter to me says:

I was born, raised, and have always lived in a timbered country, and have watched the effect of timber upon natural watercourses, and I am thereby fortified in my belief that your position is correct. My brother owns a farm in Sheboygan County, Wisconsin, a county heavily timbered. He built a shingle mill on the creek passing through his farm, and ran it by water power, but as the land surrounding him became shorn of its timber, and cultivated, the stream diminished and soon became dry. He sold, and purchased another tract in the next county north, and when I first saw it in 1861 there was a stream running through it containing sufficient water to allow him and others to float double length railroad ties by the hundreds down to the market. The surrounding country was rapidly cleared, and within six years the stream became dry, with no water, except in rainy seasons.

In a book by Palissy, and in several other French works, there are accounts of how to create springs by planting trees upon declivities, and making at the lowest part a cemented wall on the rock or hard pan, to intercept the continual flow caused by the trees. Three or four acres, according to their account, will make a fair spring.

Measurements of the average depth and discharge of water from the principal rivers of Europe have been kept for a long period. Those rivers, from whose headwaters extensive clearings have been made, all show a diminished average discharge of water. Some of these rivers are the Rhine, Elbe, Oder, Danube, and Volga.

California uses much water in irrigation, and in the south pays high for the fluid for domestic use. The value of water here, already considerable, must increase with the population. Consequently it is of vital importance to preserve, at least, the present capacity of the mountain watersheds, to retard the melting snow and the delivery of rainfall, so that torrents shall not form while the springs and streams are maintained.

The State of California has no practical forest system, neither has the Federal Government. The forest lands of the State in private hands are beyond the control of the State Board, and the State school lands, and government lands in forests are common to all for entry, pasturage, etc. No forest officer has any control over them, except to arrest for setting fires in the woods, and even in this the circumstances are so adverse to fixing the guilt for these fires, that with the utmost efforts few arrests can be made and fewer convictions had.

The State sells its lands without any reference to the timber upon them. Where timber land is bought in this State the timber is all that it is bought for, and after this is cut it is usually abandoned for taxes, if, happily, all the school payments due the State have been made. On the school timber sections wood and lumber have hitherto been taken without so much as a by-your-leave from any one.

This Board is, as far as we know, the first official body to ask for an accounting for the schools from the wealthy firms who have taken such timber. We have a special agent and assistants now in the field collecting evidence in these and other forestry cases by affidavits. The amount of money involved is very considerable and belongs to the schools. We are obliged to proceed through the Attorney-General of the State, and hope to secure his cooperation in our work.

The United States land system only allows a man to acquire one hundred and sixty acres of forest land. This is far too little to warrant the building of a modern sawmill; consequently lumbermen have either cut timber without title to the land, or used "dummies" to obtain by fraud and perjury what they required. There are doubtless cases in which lumbermen have good titles.

The Government has for some time had special agents on the coast to secure evidence against illegal cutters of timber. These officers now have a great number of cases on hand, for the practice of robbing the Government

lands has been general. One case, that of the United States vs. The Sierra Lumber Co. for \$2,000,000 worth of stolen timber, is now on trial, and another involving six hundred fraudulent land entries in Mendocino County, in the interest of one foreign firm, is before the Courts. These are the leading cases of each kind. These lands are almost all worthless, except for the timber on them.

At present there is no management over pasturage here; robbed there; burned everywhere—this is our forest land system.

A few special agents report, a prosecution or two is started, but the Government attorneys, from some cause, bring few to trial.

Fraud and illegality is at a premium in the lumber industry, and the honest man can hardly tell what to do in it to live and follow the law.

Such a system with such results must be bad. A vast property is being squandered, the country endangered, and the citizens tempted to violate the law.

What the timber men want is the timber, not the land. What the people in general need is that the water-holding power of the mountains shall be preserved.

A sensible forest system can sell the timber, while preserving the reproductive power of the forests, and the forest itself as to its water-holding capacity, just as is now done in South Australia, India, and Europe. The forest land ought not to be sold. Not another foot of it should be sold by the State or by the Federal Government.

California has no time to lose in protecting her own forests, and should commence the work at once. National law, or no national law, there ought to be a California law, under California management. This State needs very different treatment, from a forest point of view, in its different sections. Parts of it would be promptly ruined by the removal of even extensive areas of mountain brush, as in the south, while other parts would be much benefited by diminishing the forest area in a reasonable manner, as on the northwestern coast. In extensive portions of the State, plantations of trees should be made, as wind and frost breaks, and generally for climatic purposes, as well as to give local supplies of firewood and timber, while in others there may be an advantage in permanent clearings on the arable lands. The decision in such matters should come under the control of an intelligent State forest management; so also should the commercial cuttings in the forest, to prevent waste; to use only the ripe timber, or judicious thinnings from too close growth to insure reproduction in the forests; to prevent and put out fires; and to secure such fees from the users of forest products as at least to pay the cost of management.

The rapid exhaustion of forests in the United States indicates clearly that the present demands for timber in California must soon be largely increased. The purchase of considerable areas of timber lands by foreign and eastern capitalists shows that this danger is upon us; now is the time to act. The day has come for the United States, as a nation, when the preservation of our forests is more desirable than their destruction. For this reason, if for no other, I recommend the abrogation of the protective tariff on lumber, which taxes the whole people for the benefit of the few lumber combinations, and sets a price upon the head of every tree in the land. Whatever reasons can be adduced for the protective system which places the taxing power of the Government in the hands of private persons, and, at the expense of the masses, enriches the few, none of them can apply to the forests; for these, it is our interest to keep, and not to destroy. All persons, of whatever tariff views, should unite in demanding the repeal of the timber tariff.

It is with pleasure that I perceive the increasing interest in our forests which is appearing through the country, and especially in California. It is with pleasure that I can report a marked decrease in forest fires, where we have been able to send our officers and fire notices. These forest fires are a desolation. Beautiful mountains covered with verdure—the homes of the bee man and the settler, the crops of the farmer, the lumber of the woodman—all are ruthlessly swept away by them, and a scarred and blackened landscape takes the place of beauty and plenty.

It gives me pleasure, besides, to say that there is a good prospect for the recovery to the schools of the value of timber taken from school lands. We shall introduce an Act in the next Legislature, withdrawing these lands from sale, and placing them in the control of the State Board of Forestry.

California, most lovely land—land of plenty, land of the sportsman, the farmer, the irrigator, and of the lumberman.

Here grow the fig and the vine, the orange and the apple, the laughing barley and the rich wheat. In our varied climate we possess delights and perfection found nowhere else. All this riches of to-day, all this promise for to-morrow, is guarded on the mountain walls by sentinels of oak, skirmishers of chaparral, by armies of pine and fir, and the serried ranks of giant redwoods.

These guard our valleys and our streams, we must guard them.

MR. STABLER: I have been much instructed by the essay of the gentleman, and I believe for one, that the importance of this subject cannot be overrated. I am glad the movement has been made before the different societies of California and the Board of Forestry, and this body for the preservation of the forests of California. They are our pride and should be protected, and if they are destroyed, the industry of man cannot replace them, nor can nature replace them within the life of man now living.

Therefore, I offer the following resolutions:

Resolved, That the fruit growers of California, in Convention assembled, request that Senators Hearst and Stanford, and the Congressmen of this district, use all proper means to secure the passage of the Forestry Bill, recommended by the State Board of Forestry, a copy of which is hereto attached.

Resolved, That the Secretary of this Convention is hereby instructed to send a copy of these resolutions and this bill to each of the Senators of this State and the Representatives to Congress.

Carried.

MR. BETTNER, of Riverside: I have also a resolution that I would like to offer. It has already been explained by Mr. Kinney that the timber school lands of this State are being depredated upon by the parties who take up these timber lands solely with the expectation of denuding them of timber—possibly making all payments and possibly not; and after the timber has been taken off the land is destroyed of all practical value, and the school funds thereby are deprived of the benefit of a good portion of the value of these lands. If these lands are placed under the control of the State Board of Forestry, this income, instead of being spasmodic, instead of terminating with the first or second payment, will be eternal. The State Board of Forestry proposed to draw these school lands from entry and sale and place them under the control of that Board with a view of a sale of the timber, and in this way making a constant source of income accruing to that fund which will continue to all times to come. I therefore offer for the indorsement of such a bill this resolution:

Resolved, That it is the sense of this Convention that all unsold school land and other timber land belonging to the State and in the State of California, should be withdrawn from

entry and sale, and that all such timber lands should be placed by the Legislature under the control and management of the State Board of Forestry, and full powers granted to that Board to control the sale, renewal, and preservation of the timber upon them; provided, that all funds accruing from timber sale, or otherwise, shall be turned over to the State School Fund by said Board, after the necessary expenses for sale and management shall be deducted.

Resolved, That the Secretary of this Convention be and he is hereby instructed to forward a copy of this resolution to the next Legislature as soon as convenient.

DR. KIMBALL: It seems to me that there is a great deal in that resolution. While I, for one, am in favor of preserving our forest trees where it is compatible with private ownership, I think it would be a piece of legislation that would not be for the good of the State to lock up all unsold school lands, whether timber or not, in the hands of the Board of Forestry.

MR. BETTNER: I only included the timber land.

DR. KIMBALL: Even in that event I believe there are other methods of preserving our timber, that would be found more effective than that. It would be better for the State to pass some legislation in regard to increasing the price of those lands, and compelling a different amount of payment. It is asking a good deal to lock up such an amount of the domain of this State as belongs to the Public School Fund where it cannot be used. The value of this land, from year to year, will necessarily increase with the influx of population to this State, and the time is not far distant when every acre that will bear trees will be found to bear some other kinds of trees. That will add to the interests of this State, and I believe that other legislation would be wiser, more to the point, and more effective.

MR. STABLER: I differ with Dr. Kimball very materially. Now, the school lands of this State has been subject to sale for nearly a quarter of a century, and they are nearly all sold, only those remaining in the mountains are unsold where there is timber. Now, it is a notorious fact that persons from all parts of the globe are coming here and denuding our mountains of their timber; we want a positive and dead stop on it at this time. I am in favor of checking at this time the sale of the little that is now left. The resolution is rather sweeping, but the time has come for it to be sweeping. Let this resolution go to the Legislature, to show that we are in earnest in preserving what timber there is left. It is not binding on them; it is merely advisory. Let them take it for what it is worth. I hope the resolution will pass as introduced.

MR. SMITH, of San Mateo: The Board of Forestry Commissioners and many gentlemen, who have thought on this subject, believe that such a bill as proposed in this resolution not only will do the State School Fund no harm, but will gradually increase its revenue. The State Board believes that intelligent supervision of these forest lands will gain to the State and therefore to the School Fund. They believe that if these forests are protected that the sale of timber from them will continue, that it will not be a thing of a few years, but a thing of many years, and that eventually, not only the State School Fund, but the whole State will gradually profit by such a proposed supervision.

MR. CHAPMAN: Considering the fact that our Government is now encouraging the destruction of our forests by making a tariff on lumber, I think it is well that we should protect our timber interests, because the very life of our State depends upon her trees, as is shown in the essay of Mr. Kinney. I therefore move that we adopt the resolution of Mr. Bettner.

MR. BETTNER: I do not desire to detain the Convention with any long speech. As I am a member of the Board of Forestry, I feel some little delicacy in saying anything at all in support of the resolution, although I have no interest in it. There is no emolument for that office, and I believe

the only object the members have had in any efforts they have made has been the good of the public, and this resolution has been framed with that end in view. It is possible that they may be mistaken, but still the Board has given a good deal of thought to this question, and it is undoubtedly the case that the forest lands of this State are suffering at present from many causes: from fires, and from unnecessary waste and destruction, by wanton destruction of the timber for the purpose of utilizing a very small portion of it, by the destruction of the sheepherders, by destruction by fires which are set, many of them carelessly, many of them purposely, and by many multifarious reasons. Now, I think Doctor Kimball is in error in describing this area of school lands as being so large; Judge Stabler is very much nearer the mark, so far as we have been able to ascertain. He describes them as very limited. Such timbered school lands as remain in this State are generally in inaccessible mountains, or at all events, at such an elevation above the sea as precludes any practical agricultural pursuits upon them; but still a large proportion of the truly agricultural lands in this State, in many cases, depend for their value upon the preservation of the forests that remain. These school lands represent but a small portion of them, and unless the forests that belong to the National Government can be preserved, this matter will cut but a very small figure. All of us who are residents of California are familiar with the great destruction that has been brought by the mining debris, brought down by our rivers. As Mr. Kinney has said, this mining debris is but a drop in the bucket; if the destruction of the forests continue unchecked, when the mountain sides become denuded of their timber the natural currents that will then arise will bring down such amounts of debris, that that which is now brought down by the streams amounts to nothing, comparatively speaking. This resolution is, I think, one that from a pecuniary standpoint in regard to the School Fund, is desirable. The advance in the price of land will hardly check the evil that now prevails. As I understand it, the payments are made in different installments, and one or two installments perhaps are paid, and then the timber is stripped and the land is allowed to revert to the State in a worthless condition; that cannot be changed by simply advancing the price of the land; only a few more dollars would be realized on the first payment, and that would be the end of it.

The resolution was adopted.

THE APRICOT.

Essay by DR. EDWIN KIMBALL, Haywards.

It was a happy thought of the old mythologist in giving a distinct personality to all things. There was a real life in all; the material as well as the invisible became living, spiritual personalities. The sea spoke of peace, joy, remorse, and eternity. The rolling thunder was the voice of the mountain, and the lightning was the flash of Jove's resplendent armor and his invincible power. The wind spoke with a hundred tongues. Each leaflet of the forest, each blade of grass, murmured the song of hope, love, and exaltation. Nature, far and wide, above and below, was a revelation.

And so to the devoted orchardist, as he walks alone and in silence among his trees, comes the quiet whisperings of their wants, their hopes, and fruition. They trust him like children. His will is their law, for he is their creator. So, in thinking of a fruit tree, we may elevate it to the dignity of a living, breathing personality, that may live after us and bestow its bless-

ings in annual gifts upon our children. Among all our fruit trees, the apricot is one of the most beautiful. Away back in the dimness of years it was first known in western Asia—the cradle of the human race. It has survived the rise and fall of dynasties, and all the mutations of empires and kingdoms. The Assyrian, the Babylonian, the Persian, have in turn planted the imperial tree, rejoiced in its fruitfulness, and bestowed its delicious conserves and delicate wines in offerings and oblations on the altars of their divinities. It still abides in its old home, and may be found in all the Orient. The traveler may now sit under its broad spreading branches from the Euphrates to the Mediterranean, and from the Black Sea to the Persian Gulf. It has followed the march of man and civilization west through southern Europe and northern Africa to the pillar of Hercules. It has crossed the sea, traversed a continent, and found at last in our generous soil and genial climate, the land of promise and hope.

There is no exhibit that demonstrates more thoroughly the richness and glory of our fruit wealth than a well kept apricot orchard. The fruit is beautiful and luscious; the tree is grand and imposing; its branches reach out in their strength and greet the strongest breeze with joy and delight. The almond is only in advance in its bursting blossoms in the spring time, but it is soon overshadowed by the richer, warmer beauty of its expanding petals and golden crown. Its first leaves tell us of its eastern home; tender, delicate, and variegated as the song of the Persian poets. They broaden out in richest green, luxuriant and triumphant in orchard beauty. The orange is solemn, rich, magnificent; it is for all the year, and lives a century. But the apricot comes like a surprise. It runs riot with joy and promise, and culminates like a golden dream of riches. It is at present the tree of hope for many parts of California, and belongs to us alone; for no other State of this broad land can raise the apricot with success and profit. No fruit tree is more vigorous in its growth, more rapid in its development, and swifter in repaying a hundredfold the generous care bestowed by the intelligent orchardist.

The way is clear for the future of a great industry, and the question arises—where in this great State of almost boundless extent and possibilities the apricot should be planted to attain the most productive results. It can be grown on all our hills, in all our valleys, for it is tenacious of life under the most adverse circumstances; but it is in deep, rich, alluvial soils, thoroughly drained, where the temperature is even and where the atmosphere is softened by the breath of the sea, that it attains its greatest size, its most beautiful coloring, and its most exquisite flavor. It is in bloom earlier in the bay and southern coast counties than in the interior valleys; but the intense dry heat of the interior brings the apricot to maturity a month earlier than in the more temperate region of the bay and coast. Thus it will be perceived that the intelligent orchardist will select a suitable location, if he desires, in this branch of orchard industry, sure and substantial results. Many extensive apricot orchards have been planted in this State that have been positive failures, and many that produced indifferent and uncertain crops of fruit. The apricot will grow almost anywhere in California. Down on the banks of the Colorado River, stimulated by the intense heat and abundant irrigation, its growth is rapid, and in fruiting it is precocious. Even under the burning sun and desiccating atmosphere of the Colorado desert, it triumphs and yields its tribute of the earliest fruit in the State to the salamander-like cultivator. It flourishes in the many oases that the hand of diligence and labor have developed in many of the southern portions of the State. From the Tehachapi through the great inland empire of the San Joaquin, along the foothills of

the Sierras to the Shasta Mountains, through the broad, rich valley of the Sacramento, in all the valleys around the bay of San Francisco, in all the sheltered nooks of the Coast Range down to San Luis Obispo, where it reaches down almost to the ocean shore and continues to the Mexican line. Here is a wide scope of country where its cultivation is possible; but its success is certain and its cultivation the most profitable where it breathes the salt air of our magnificent bay and looks out from the tranquil shores of the Pacific. The Asiatic coast of the Black and Mediterranean seas has been noted in all times for this beautiful fruit. Greece, Italy, southern France, Spain, and Portugal now cultivate the apricot, and with them we must contend for the possession of the world's market.

We may safely claim the whole North American continent as our exclusive heritage for marketing this fruit. Our superior product and import duties precludes the possibility of any interference with this great empire and its teeming millions.

The varieties of this fruit are marked and distinct. The Moorpark is doubtless the largest and finest flavored of all apricots, but there are many places where its fruit is uncertain, and when it does produce it ripens unevenly. It is the tenderest tree of the whole apricot family. If the months of January and February are too warm its buds swell too rapidly, and a cold rain or lower temperature will chill the sap and arrest the future development of the blossom buds. I have seen this phenomena in three consecutive seasons. The Blenheim, or Shipley, generally sold by nurserymen, has also its disadvantages. While its quality is good, it ripens too swiftly, and in large orchards of this variety there is almost a certainty of great waste in picking, shipping, and properly manipulating the crop. The Royal, all in all, is undoubtedly the apricot for the best results. Always productive, by judicious pruning and thinning it is almost as sure as the seasons. And when properly grown it is of good size, excellent quality, ripens gradually, hangs long on the tree, is eagerly sought by the canning fraternity, and makes a splendid dried fruit.

The planting and cultivation of the apricot embraces a broad and fertile field of investigation and experience. It has been tried on all varieties of stocks and under all imaginable conditions of soil and temperature. Some orchardists have endeavored to compel the tree to grow and produce under the most formidable conditions. If the soil is heavy adobe or a light loam over an impenetrable clay subsoil, then grafted or budded on the Myrobolan plum stock, it can be made to grow and produce some fruit, but the success of the experiment will be as problematical as the conversion of the Mongolian to modern ideas or the Christian faith. The peach stock is widely used and with generally good results, for it grows well where the apricot can be profitably raised. But in deep, dry loams, there is no stock that will make such magnificent trees or produce such perfect fruit as on stocks grown from pits of the Royal, Blenheim, or Early Golden apricots.

The cultivation of this naturally thrifty tree is simple and well understood. The winter months are the best time to plant. Broad, deep holes, and thoroughly pulverized soil should be the sure foundation for the future tree. They should never be planted less than twenty-five feet apart, for it is a tree for a generation of men. When planted the grounds should be kept thoroughly cultivated.

It is possible, and even better, with ordinary winter rains, and deep, generous soils, to produce the most perfect fruit without irrigation even in our hottest, driest, central valleys, while in our more favorable locations of the bay counties irrigation would ruin the quality of the fruit.

The pruning of the apricot tree is the rock on which many young and

inexperienced fruit growers, in their anxiety for immediate results, run and are wrecked. It is a tree that, like our youth, needs early and effectual discipline until its habits are formed and it enters upon its golden age of maturity and productiveness. The most prolific of all our fruit trees, its very abundance is a source of embarrassment. The trusting fruit grower looks with delight upon his acres of thrifty trees, bending under their weight of green fruit, and anticipates the golden harvest, forgetting that nature is always prolific and provides securely for a never-failing posterity. The law governing the profitable growth of all our fruits ignores nature's great motive of reproduction, and, by judicious pruning of the tree and thinning of its fruit, preserves, for a generation, the vitality that would otherwise be wasted in a decade of years. No tree demonstrates this more thoroughly than the apricot. A tree will cease to be profitable when its vigor is gone and its vitality destroyed by overbearing of inferior crops of almost worthless fruit. The fruit pulp protects only the precious pit or seed, and nature is indifferent to its desirability for the taste or nourishment of man.

And here is where the skill and experience of man for centuries has evolved through endless experiment and selection all our richest and choicest fruit. Our illustrious progenitors in the primeval Garden of Eden, fresh from the Master's hand, possibly may have reveled in the most delicious and nectar-like fruits, but the presumption is strong that their pristine simplicity and trust in the wiles of the tempter was paralleled also by severe poverty in their primitive pomological wealth. The prudent, careful orchardist must use the knife unsparingly for the first four years, unmindful of fruit, and the tree will grow in strength, symmetry, and beauty. Every branch will have its allotted place, and the sunshine will look in on all the limbs and twigs and give color and sweetness to the ripening fruit. No general rule may be given to the pruning of the apricot, only that its growth may be directed, its exuberance restrained, and its annual growth kept, if possible, in equilibrium. The apricot kept always in vigorous growth, and fruit well thinned, will yield almost sure annual return. With a full setting of fruit, three quarters at least should be removed, and then there will be twice the amount of available fruit pulp at the time of harvest.

The apricot tree is subject to but few diseases. Nature has endowed it with such wonderful recuperative power, that, although riven and broken by the tempest to apparent destruction, it sends forth new branches and is soon stronger than ever. Trees of twenty years' growth may be cut back in the winter months to half a dozen forks, with sloping cuts well covered with a solution of shellac and linseed oil, and they will be renewed in productiveness, quality of fruit, and apparent longevity. Occasionally a tree perishes in May with the blight. From full vigor of leaf and growing fruit it withers in a day. There is seemingly no known remedy for this acute disease, that some seasons affects other varieties of trees. The shot-hole fungus has often trenched on the profits of apricot orchards in some parts of the State. This pest illustrates the necessity of vigilant action in blotting out this trespasser on the most beautiful of fruits. It appears in the incipient stage immediately on the setting of the fruit and the expanding of the leaf, with rough, wart-like specks and patches on the skin, destroying its beauty and seriously injuring its flavor, and rendering it unfit for canning or the market. When the fungus affects the leaf it destroys its substance, and the leaf has the appearance of having been riddled with shot. Air-slacked lime, thoroughly and plentifully sprinkled over the tree

immediately after the setting of the fruit and bursting of the leaf, has proved an effectual remedy.

The present large and increasing acreage in apricots is unprecedented in the history of its cultivation. Millions of people in the United States are totally ignorant of its great value as an attractive, wholesome commercial product. As a table fruit, when well grown and thoroughly ripe, it rivals all others. When properly canned, it is the most delicious of all California fruits, and when properly dried, it has only to become known and it will be the favorite dried fruit of the world.

The time has now come when only the best and most desirable varieties should be grown. Extra care should be taken in pruning, thinning, and cultivation, so that only the best, largest, and most attractive fruit should be grown. The canners and shippers will soon accept no other, and the thousands of busy hands now needed will soon have to be increased tenfold; so no time should be wasted on small, inferior, and imperfect fruit, that destroys the reputation and checks the domestic and foreign demand.

The prospective annual increase of thousands of tons demands the most careful preparation and organization to successfully handle the vast amount. It should be arranged with the care and precision of a military campaign. Canners must double their forces, and those that ship should have large numbers of boxes in reserve.

The time is at hand when the grower must depend on drying as the only method of disposing of the vast surplus. Evaporating or machine drying for this large amount is an impossibility. Every grower should provide the means to dry his entire product, regardless of canners or the market. It will sustain the price, and enable him to act independently of the canners and the vicissitudes of the daily market. All possible arrangements should be made for the needed labor. Schools should be vacated in the drying season, and the rising generation have a practical lesson in industry and economy. Trays and all necessary conveniences should be prepared weeks in advance.

Sun drying must be the main dependence. It is cheap and effective. To make a perfect dried fruit it must be thoroughly ripe, and the product will never be a disappointment. The market demands an attractive, even product in dried fruit. To accomplish this, the fruit immediately after cutting and placing on the trays should be subjected to sulphur vapor for twenty minutes in a close cabinet, or box, with sides prepared for the purpose; or placed on low trucks and rolled on tramways into small, close, suitable rooms prepared for fumigating the fruit. It will then rival the most carefully evaporated product. Sulphuric acid, if existing at all, will be found only in infinitesimal quantities. This sanitary question is one for the chemist and public to settle; but the generation that wears tight shoes, stays, eats arsenic, and is saturated with nicotine and tobacco juice, with the necessary adjuncts of drugged liquors, beer, and wine, will hardly call in question the premature and moderate use of brimstone. Upon the proper management of the dried fruit business depends the prosperity of the orchards of this great State.

All of our fruit interests are to-day in the ascendant. Orchards and vineyards will soon cover the land. The olive and almond will soon displace the chaparral on a thousand hills and embellish them with homes of plenty and peace. Surely, this highest of all husbandry should elevate and ennoble the race. The world of fruits, like the world of men, rises on every swelling tide of cultivation, material prosperity, and peace, and ebbs away in their decline and poverty almost to the verge of extinction.

The Ægean shore saw the birth, culmination, and death of a race favored

of the gods, in form, strength, grace, inventive genius, and mental power. The artist's brush lost its skill, the sculptor's hand its power to make the spotless marble radiant with life, beauty, and strength. The flowing numbers of her poets and the melody of her minstrels faded away like a dream. The inspiration of matchless oratory was a thing of the past; and with crumbling temples and desolate shrines, art, knowledge, and law passed away. The decline and destruction of a great people means not only moral, mental, and material desolation, but the fading away of nature's richest ornamentation—the flowers and fruits that have adorned, refined, and made glad the race.

Every great advance in the world is preceded by some wonderful evolution in nature's great laboratory of plant life. Thus from the springing blade and bursting ear, ushering in the harvest time, the unfolding blossoms full of hope and promise, come all that is good, elevating, and progressive among mankind; and in the labor and experiences of man in the garden, the field, and among the trees, we may learn the story of his religion, his civilization, and all his life.

DRYING AND CANNING OF FRUIT.

MR. WAGONSELER: I should like to ask the process of sulphuring fruit and afterwards drying it in the sun without any regularly prepared patent drier—whether it can be done, and if so, the cheapest way.

MR. GLADDEN: I dried in the sun, and I have a drier I use to a certain extent. I dried rather more peaches than I sold to the cannery, although the cannery was half a mile from my orchard; but the capacity was too small and could not receive fruit; therefore, I dried a good many peaches. I bleached all of them and dried nearly all of them in the sunshine; but when it came to selling them the man to whom I sold didn't wish to give me as much for my machine-dried peaches as he would for the sun-dried, because he said the sun-dried peaches were the prettiest and were a better article in the market. I noticed this: the peaches dried with the peel on, the under side, the peeling side, of the peach was not as fine a color; it appeared to be a little brown; it was not just exactly the color it was when it came off the tray, whereas the sun-dried bleached peaches were just as yellow on the skin side as they were when gathered; and in comparison of my sun-dried peaches with those dried in a machine in town, Mr. Chapman admitted himself that mine were rather the nicer article. The trays that I use for the sunshine were six feet long and three feet wide. In the morning when we began cutting peaches we filled perhaps two trays, and then placed a can of burning sulphur in a bleaching box underneath, which held six of those trays; and by the time it was full the first put in would do to take out, and I kept the sulphur going pretty much all the time, taking out those which had been in the longest. Our weather for drying was mostly good, though at first we had some fog. The first week of the peach drying we had a considerable amount of fog, but whenever we found a strong south wind, knowing that it would probably be foggy during the night, we would stack the trays up. They were cut to a pattern 6 by 3, made of lumber an inch thick and two inch sides, and they fit very closely; so that in the morning when we put these trays out, when the fog would be dispelled, they did not seem to have received any dampness during the night, while the trays left out and not stacked would be dripping with water; but we only had a short spell of that. The rest of the season we

didn't stack them, and when we had a north wind it appeared as if they dried nearly as much at night as in the daytime. I will say, gentlemen, that my success in sun-drying peaches has been all I could expect. I could do a little better next season from my experience. In the market they were very anxious for them, and paid a greater price than they paid for the machine-bleached dried peaches. I had a Champion, a small machine, but when it comes to work this machine, as far as capacity is concerned, there is no comparison between it and sunshine.

A DELEGATE: Which did you find the more profitable, the peeled or unpeeled?

MR. GLADDEN: The peeled peaches were rather more profitable. One thing more. I believe Mr. Hadden is exactly right in saying that we should have the fruit gathered carefully, and should gather good fruit to be dried if we want good dried fruit. I am not in favor of having it bruised, but I took bruised peaches, and after bleaching and drying them they didn't turn black. The color was all there; they were spread out, but they were nice in point of color; but I am not in favor of having over-ripe peaches, though I want them to be mature.

A DELEGATE: Did you pack your overripe peaches by themselves, or with others?

MR. GLADDEN: We dried them by themselves.

MR. BUTLER: What was the difference in price?

MR. GLADDEN: None at all; but it looked better. I put some of those in sacks by themselves, and when I sold them they said they would give the same, although they didn't look quite the same in shape, but in color they did. If dried carefully in the sunshine, they will dry nicely, although the shape of the peach is not so good.

A DELEGATE: What is the difference in price between your peeled and unpeeled peaches?

MR. GLADDEN: Unpeeled was 12½ cents, and the peeled was 18 cents, in sacks, and the sacks furnished.

A DELEGATE: At those prices, you think you made more money from your peeled than from your unpeeled?

MR. GLADDEN: Rather so when I used lye; but when we peeled by hand, it was much slower than the other process.

A DELEGATE: Did you handle any cling peaches?

MR. GLADDEN: Yes, sir.

A DELEGATE: Did you have any difficulty in removing the pits?

MR. GLADDEN: No; not very much. The worst of it is about peeling and pitting cling peaches. We can pit cling peaches, and dry them with the peels on pretty fine; but if you peel them first, before they are pitted, they are like an eel—pretty hard to handle, using such knives as they have at the cannery; therefore, I didn't try peeling very many cling peaches. We peeled a few with machines, and then tried them with lye; but they didn't peel as nicely with the lye as the freestones, and we peeled with the machines; but the women I had cutting them complained so much of them being so slick, and cutting their hands with the pitting knives, that I concluded that we would dry them with the skins on, and for that purpose we just pitted them with the pitting knives.

MR. BUTLER: Do you find it much more expensive to pit cling than freestones?

MR. GLADDEN: No, sir; they do it very nearly as fast. And I think that my clings turned out dried fruit equal to the best freestone, unless, perhaps, it was the Salway. I have had but very little experience in drying cling-stones until this season, and then I dried three tons of clings and was very

much pleased with them. There has been objection in my part of the country to planting clings, on account of the difficulty in drying them, and men would not buy cling trees very much, because they would say that if we can't sell them in the fresh state we can't do anything with them.

A DELEGATE: Which do you think was the better after they were dried—the cling or the freestones?

MR. GLADDEN: I think the clings made the prettiest looking fruit. I don't know as I could hardly say, but the cling makes a beautiful fruit. I could not get any more for mine. I exposed them to purchasers, but they didn't give them any preference. I don't think there is any necessity to be afraid of drying clings.

MR. BLOCK: I would like to ask the gentleman how long he kept them in the sulphur?

MR. GLADDEN: Well, about from twenty to thirty minutes. There is a very great difference of opinion as to the proper time. I dried some apricots, and the gentleman who was assisting me says: "You don't sulphur your apricots enough." He said: "In Vacaville they sulphur them an hour and a half." I said: "Are you certain they do that?" Said he: "I know it; I witnessed it; I was right there and saw them drying; and they don't consider an hour and a half any too much at all." I said: "What kind of fruit do they make?" He said: "Very fine; they are away ahead of you," and I asked him about the peaches. He said: "They don't sulphur them quite so long as the apricots, only about half an hour." Well, I do not know anything about it; but I think from my experience with peaches, from twenty to thirty minutes; and, if you have a good strong fire, twenty minutes would be plenty. I used crude brimstone out of the mine. I tried one pound of sublimated sulphur, and I tried brimstone, but I think a pound of crude sulphur is worth a pound and a half of most anything else.

MR. STABLER: You said that the clingstone peach could be dried easy without being peeled after taking out the pit; now, there is this process which Professor Hilgard mentioned late in the season, where they use the pit. Couldn't you use that—take the pits out of the clingstones and dip them in that and peel them?

MR. GLADDEN: A neighbor of mine tried dipping them in brine, but he didn't do well. I do not mean to say that you can dry clingstone peaches better with the skins on than you can dry them with them off.

MR. TOMPKINS: Professor Hilgard speaks of the evil of bleaching dried fruit with sulphur. I know for a long time, I, in common with a great many others, thought he was at fault, and particularly that there was nothing like the damage he claims, but I am a convert to the professor's views: there is no question but what the use of sulphur, and the way it is done, burning it right under the trays of fruit, must impregnate a good deal of it so strongly with what I believe the professor calls sulphurous acid, which afterward turns to sulphuric acid, and that certainly is rank poison. Now, these men who are in the business of evaporating fruit, their idea is to get on the market what will sell the best to-day; it makes no difference to them whether it kills off all the trade we have, or not. I think by sulphuring that we are injuring those that buy of us just as much as we possibly can, especially on the fruits that are dried whole, as some of the large white plums are; the sulphur fumes will follow the stems and impregnate the pit so strongly that it is hardly possible to cook it out. I am also informed by Mr. Coates, that in Europe all use of sulphur in preparing dried fruit is absolutely forbidden. I am also informed by our President, that walnuts cannot be sold in San Francisco that are bleached with sulphur. That is

certainly a favorable sign that people are beginning to take a better view of the case, and eat something that is not so nice in appearance, but tastes better, rather than to take something that is quite harmful.

MR. GLADDEN: Mr. Hadden seems to advocate bleaching with sulphur, and until the time comes that the injury is manifest, I shall continue to use sulphur, and then I will save the expense of sulphuring.

MR. PECK: I would like to ask the gentleman if he sulphurs the fruit that he dries for his own table?

MR. GLADDEN: We have some put away for our own use both sulphured and unsulphured, but for my own part, I believe I prefer that which has not been sulphured.

A DELEGATE: I would like to ask the gentleman if he can tell whether it has been sulphured or not, to take and cook it at this season of the year, a month or so after it has been sulphured?

MR. GLADDEN: I have been tried on that and could not tell the difference.

MR. WAGONSELER: I find that people in buying dried fruit don't taste it; they want to please the eye. Last year Mr. Meek examined my plums, and he looked at them, but I don't think he tasted them at all; this year, having quite a lot, Mr. Allison looked at them. I don't think he tasted one; and from what I can learn and gather, in preparing dried fruit we have got to please the eye. Now the question arises, if the sulphuring will please the eye, and those persons will buy our fruit sulphured quicker, by looking at it, I say sulphur; if, on the contrary, they don't, we will not sulphur. I know I have shipped apples to San Francisco, which I myself would not eat, and could not sell in our retail market. They were large and spongy, and they brought twenty-five cents a box more than apples that were much more palatable to our country taste.

A DELEGATE: I think that we are getting on dangerous ground when we have to go to work to poison our fruit to get a market. That is about the way it appears to me. Now, there is a question in my mind but what every pound of sulphur that is used in the fruit produces so many pounds of poison; and if we get a market now, we get it at the expense of the future—that we are destroying our future market by making the present market. Now, will any one take fruit and burn sulphur and bleach it if they have any idea what they are making to be eaten? It is certainly a poison. If it doesn't spoil the taste and ruin the market, it will ruin the constitution eventually. This is my first season in drying fruit of any kind; and some of my neighbors have been drying, one particularly, a doctor—he dries his fruit; and he bleached it very nicely, and he brought some of it into market, and he says: "This is very nice; this is nice fruit." And he is asked, "How do you make it so nice?" "Well, we sulphur it." "Well, is sulphur healthy?" "I guess so." "Are you using any of it?" "No." "What kind are you using?" "We are using the other kind; we don't sulphur ours." "But, doctor, why don't you do it?" "Well, to tell you the truth, it is poison." Now, I ask this Convention, is that the right way to do? In regard to my own fruit, peaches and apricots, I dried them in the sun, without bleaching. I thought that I would take the chances of one crop, what I had, and would run the risk of losing that entirely before I would bleach it; and if I lose it this time, I will quit. It have not tried to sell it, yet; it looks very nice, and tastes very nice; it don't look as nice as the bleached fruit, but to my taste, it is a great deal better.

MR. TOMPKINS: There is another matter about this question of appearance. If it was sold as an ornament, not to be eaten, then there might be some excuse for laying so much stress on the habit of those men who buy and do not taste the fruit. They buy it because a vast number of people

in the East want to eat it; they don't want to look at it. If they merely want to look at it, well and good; but when it comes down to a question as to what is healthy and what is not, I have no doubt that sulphur is unhealthy, and furthermore it is unnecessary, for by the process that Professor Hilgard has spoken of, of which samples are shown at the Horticultural Board rooms—namely, dipping the fruit in a solution of brine—a very fair article is produced. It has neither the color nor the whiteness of the sulphur, but it is white enough for all practical purposes, and prevents the edge of the fruit from becoming black.

A DELEGATE: On what authority is the statement that the sulphur is poisonous?

MR. TOMPKINS: On the authority of Professor Hilgard. He may not have said that of itself it is poisonous, but he said that by putting the fruit over the fumes of the sulphur, sulphurous acid is formed, and which turns to sulphuric acid. I know I took the matter up and studied the authorities, and I have come to the conclusion that he is perfectly right, and the sooner we come to it the better it is for us.

MR. BETTNER, of Riverside: I would not undertake to contradict the authority of Professor Hilgard, but when the sulphur is burned it produces sulphurous acid; the fumes of sulphur are poisonous; it is an asphyxiating poison; chokes you; has an irritating effect on the lungs. I do not know that it is poisonous to take into the stomach, that is in any quantities you are likely to take sulphuric acid. Sulphuric acid is produced by passing sulphurous acid through water, and is a very violent corrosive poison; it is not a blood poison, but it acts as a corrosive poison. Diluted sulphuric acid is used as a medicine; it is given as a tonic; so that moderate quantities of sulphuric acid would not poison, but on the contrary would be beneficial to health. Now, for myself, I don't like sulphured fruit any better than the gentlemen who have spoken. I do not think it is nearly as good to eat as plain sun-dried fruit, but still I would hesitate about going to the extent of denouncing this fruit as poisonous. I think the fruit growers ought to be careful before putting such a statement as that before the public: that it is absolutely poisonous. It is true, dealers buy the fruit largely by its looks, but eventually they have got to sell it to the public, and if the public do prefer to eat sulphured fruit, I do not see any reason why we should not give it to them, unless it is really poisonous, which I seriously doubt, and I do not see any reason why the grower should not have the full benefit of it. Now, when the fruit is exposed to the fumes of sulphur, suppose it is converted into sulphuric acid, it is in such a moderate, diluted form that I do not believe it can be injurious.

MR. GLADDEN: I desire to say that I am no more anxious than any person in this room to produce a poisonous article of food; but next season if I produce a crop of peaches and go to George W. Meade & Co., or to Allison & Co., and say to them that I am going to have a considerable amount of dried peaches, you bought my crop last season, and I desire to ask you this question, "Shall I bleach them or not?" Well, if the time has come that the people are going to reject bleached fruit, they can tell me that they prefer them unbleached. If they say give us nice sun-dried peaches and we will pay you more for them than if you expose them to the fumes of sulphur, then, gentlemen, I am just as ready as any one else to supply that demand. It will save some trouble and expense. But if, on the contrary, they say to me, bleach your peaches, do not overdo it but make them nice and we will pay you more for them, I shall certainly do just what I did last season. Who knows but what instead of being a poison, that being done in a proper way, it is conducive to health.

DR. KIMBALL: I think there is a misunderstanding in regard to sulphuring fruit. I started in to dry this season one hundred and sixty to one hundred and seventy tons of apricots and arranged for sulphuring, but it so happened that I sold large quantities to the canneries and only dried sixty-five tons; and, if I had apprehended that there was any danger to the health of the persons that consumed these articles dried in this manner, bleached, I would be the last person to sulphur. Alameda County has had the reputation of being a high moral county; that is where my friend is from. And, in our immediate neighborhood, we have an old gentleman approximating eighty years of age that stands on that high ground; perhaps a little higher than my friend. He started in to sulphur, and dried two hundred tons of apricots; he made a contract with a dried fruit dealer in San Francisco, and sold his apricots for 11 $\frac{3}{4}$ cents delivered in the cars at Haywards, and he thought that he had made a pretty good bargain, considering the multitude of apricots that there was supposed to be in the State, and he agreed to sulphur them. He stretched his conscience just as far as he could and put in a tablespoonful in about a half a ton. As it happened, he came up to look at other parties that were engaged in drying and sulphuring, and he saw that some of his fruit was rather dark colored, so he went back and stretched his conscience and put in another tablespoonful. The result of it was that they began to grow a little whiter, and, before the season got through, he used the sulphur pretty thoroughly. But when he proposed to deliver the apricots, the parties from the city came over and they refused to take the apricots because they were not properly sulphured, claiming that they were black and unmarketable. Judge Blackwood is the individual in question. He looked around for a customer for his apricots and sold them for about 10 cents. In the meantime the apricot market had appreciated, and those parties that refused to take them, came over and proposed to take them. He told them that he had sold them, and then they turned around and commenced an interesting suit for about \$3,000 damages.

Now, I only speak of this as an illustration of the condition a man gets into that sticks too closely to an idea, and I apprehend that Sonoma County, notwithstanding its high moral standing, when it comes to the financial point, will sulphur her apricots. I believe that the proper moderate use of sulphur in these bay counties, or in the interior, is absolutely harmless. I remember when I was a small boy that they used to march up on certain occasions the young generation and give them sulphur and syrup; I believe in sulphur now. It is quite an important factor in materia medica, and I know that sulphuric acid, to which my friend from Alameda County is so tremendously adverse, is mingled with these preparations that all these invalids and dyspeptics buy, and we know that the American people is a highly dyspeptic race, and the probabilities are that over the mountains they are worse off than we are here. Perhaps, in the line of providence, we have prepared a little of that in order to stimulate and bring them back to the regions of health. I believe that the people usually throughout the State that are engaged in drying fruit, sulphur altogether too much. I am astonished to hear that our friend from Vacaville, with their tremendously hot climate and burning sun, are so fond of brimstone; I think there are some localities where they need it, but that they sulphur for an hour and a half is a matter of astonishment to me. I can comprehend that the fruit under those circumstances would be tintured too strong even for me or perhaps for the dyspeptics; but the principal idea of sulphuring is to prevent the oxidation that takes place on exposing the fruit to the atmosphere. Now, there are many places in the interior of the State where a splendid

article can be produced by merely cutting and laying it out in the sun; the sun is so hot that there is no possibility of oxidation, and the result is a very handsome fruit. But in the bay counties we are under the influence of the bay and ocean air. There is so much moisture in the atmosphere that it becomes a matter of necessity in order to make the fruit presentable and attractive, and to arrest that I do not know of any other method that is so efficient and will be less harmful than a moderate use of sulphur. I believe that fifteen minutes of sulphuring, with good strong vapor, are sufficient. I have sulphured about twenty or twenty-five minutes, but the general idea has been from fifteen to twenty minutes, and I think that the quantity of sulphur is so small that there is no danger to be apprehended from misuse. There is another thing that these parties who are so fearful of poisoning a whole race forget; and that is the people who had apricots from California last year, and the year before, come back every year hungrier than ever. They have got in such a healthy condition, and appreciate our climate so much, that they come here by the thousands to get more of this article.

A DELEGATE: It seems to me that the amount of sulphuric acid that would be taken with the small amount of fruit that is eaten by any person at one meal would be perfectly harmless. I think that if Professor Hilgard should give us the analysis of the amount of sulphuric acid that one would get in eating, say one of our largest apricots, we would see that the amount would be absolutely harmless—infinitesimal.

MR. WAGONSELER: The apricot question has been discussed. I would like to hear some gentleman as to the best and cheapest way of drying prunes.

DR. KIMBALL: I apprehend that the great machine that our friend from Healdsburg believes in would be the most efficient thing to dry the prune. I think that the people who are raising prunes throughout the Santa Clara Valley and various portions of the State have determined that the sun-dried prune is far superior to the machine-dried; that there are certain chemical changes that take place from exposure to the sun, and make a better flavored and a better keeping article, and more satisfactory to the public in every respect. You can take the Washington plum, or the Columbia plum, or any of our sweet plums, and let them fall from the tree and remain just as they are upon the ground, and nature does the work. It is astonishing the wonderfully pleasant results that are produced. A plum that will be very acid dried on boards a foot from the ground, when it is sun-dried on the ground, or near the ground, it seems that all the acid is turned into glucose, and it becomes palatable and positively good.

MR. WAGONSELER: Can prunes be shaken from the tree and remain on the ground and be dried successfully? The reason I ask that question is that Judge McGarvey, in Ukiah, told me the other day that that was the better way to dry the prune, and the cheapest way.

MR. GLADDEN: I gathered, day before yesterday, under my prune trees, just as nicely cured prunes as any that I have, and just as well flavored; but there are some objections. It takes a long time to cure them that way, under the trees, and where I live these large rabbits have got a habit of gathering them for me. My idea is never to pick a prune, but always to shake them on cloths of suitable size, and catch what will fall from the tree, gather up the cloth, and empty them into boxes. My next work, after picking, is to have a kettle of boiling lye that will carry an egg, and with a wire basket dip them in until it affects the skin. You will see hundreds of little cracks all over the skin, and by so doing they will dry in about half the time. I took them out and put some in the drier and some in the

sunshine: and up in Healdsburg Mr. Chapman, who has some twelve or fourteen tons of dried prunes, sold them at 9 cents a pound—machine-dried—and I sold mine at 10 cents—sun-dried. After dipping them in the lye, the skin being checked, the next process is to dip them into cold water, to rinse the lye off, and then put them out on trays in the sunshine. I got about a thousand pounds of prunes dried, and there came a pretty heavy rain when nearly all my prunes were out on the trays, and it rained considerably, and made them as wet as they could be, and I began to think that I would have to take them in and put them in the drier, and commenced it; but it cleared off, and then I stopped. The sun came out, and went on drying, and I assure you that I found out one thing that I never knew before: that it was about the best thing that could happen, for those that had that rain on were the prettiest I had. Then, after my prunes are cured, I put them in bins until the final process of dipping them one more time, for the purpose of softening them. Be careful not to dip them too much.

A DELEGATE: How about the process of making them glossy?

MR. GLADDEN: I use to a gallon of water one eighth of a pound of golden brown sugar, and to about twenty gallons, two ounces of isinglass or Cox's gelatine. I tried a quarter of a pound of sugar, but it was rather too much. Get it boiling hot, and dip them in; if they are very dry, leave them in a little longer than if they are not.

A DELEGATE: How long do you leave them in the lye?

MR. GLADDEN: The lye is boiling hot, and if it is strong enough to bear an egg, I would say about five seconds.

DR. KIMBALL: I imagine that there is too much sugar put on the outside of our dried fruit. I have heard many who are engaged in the manufacture of prunes say that if you pick up a handful of prunes some sticky substance comes off, and you feel like going and washing your hands. That stuff is calculated to attract the dirt, and I think that it is not at all desirable. I have tried several things in order to get a gloss to the outside of dried fruit; I have used sour wine; I have used cider; and I have used salt water, and I believe that salt water is the most effectual of anything that I have ever tried. When the prunes are properly prepared that way, and kept in the requisite number of seconds in order to render them pliable and soft, I put them in a body and let them even up, and when they come out there is nothing sticky about them, and they have none of that offensive appearance. If you wish anything further, put in a little gelatine, or a little gum Arabic, or something of that kind, but a very little will go a great ways. This salt has another good effect: it is very bad for the larvæ of insects. As to taste, it is unobjectionable; in fact, you cannot perceive it after they are dried.

MR. GLADDEN: I tried another way a year ago for glossing prunes. I dipped some pitted plums, and of course the water was impregnated with plum juice, and then I tried using that water. It glossed them beautifully.

DR. KIMBALL: I know a gentleman who is highly opposed to sulphuring dried fruit, and he prepares his prunes, whenever he wants to put on a fine triumphal finish, by adding so much logwood to give them a fine appearance.

MR. KLEE: As to dipping prunes in salt or sea water, I think it is one of the best methods, and I believe it will prevent the sugar coming on the outside of the prune, as they do in many cases where they have been kept quite awhile.

DR. KIMBALL: I have kept them for a year and a half without any appearance of sugaring.

A DELEGATE: I would like to inquire of Mr. Klee if he thinks that would be a good way to dry figs?

MR. KLEE: It is recommended for the same purpose with the fig.

MR. STABLER: I don't think we need object to the use of sulphur till the eastern people themselves complain of it. They have been sulphuring peaches and drying them for the last twenty-five years.

MR. GLADDEN: Do you use that salt water hot or cold?

DR. KIMBALL: Hot.

Here the Convention adjourned till to-morrow morning, at nine o'clock.

FOURTH DAY'S PROCEEDINGS.

SANTA ROSA, Friday, November 11, 1887.

PRESIDENT COOPER, in the chair, announced the following Committee on Railroad Freights: James Bettner; of Riverside; S. J. Stabler, of Yuba City; and George F. Hooper, of Sonoma.

THE SECRETARY read the report of the Committee on Legislation, which was adopted, as follows:

Resolved, That the Government of the United States appropriate an adequate sum of money to be used by the Division of Entomology of the United States for the following purposes:

First—To send an entomologist to Australia, New Zealand, and adjacent islands, the native countries of the white scale bug (*Icerya purchasi*), and of the red orange scale (*Aspidiotus aurantii*), to search for and study the habits of parasites and predacious enemies of the said insects.

Second—To collect and import into the United States, propagate, and distribute in infested districts such natural enemies of the above named scale bugs, or of other noxious insects, as it may seem best to import with a view to the relief of our agriculturists.

Resolved, That we request the Secretary of the State Board of Horticulture to prepare a brief statement as to the importation of the above mentioned scale bugs into the United States, ravages already committed by them, and what is to be feared from them in future if not checked, and to furnish Senator Hearst with copies of the same for distribution.

Resolved, That the United States import duties on green and dried fruits, nuts, and oils competing with similar products should be maintained.

L. W. BUCK,
C. H. DWINELLE,
S. J. STABLER,
ELLWOOD COOPER,
G. N. WHITTAKER,
Committee.

OLIVE CULTURE.

Essay by HON. ELLWOOD COOPER, Santa Barbara.

Those wishing to embark in olive growing, I refer to my essay read before the Fruit Growers Convention held at Sacramento, November, 1885, and published in the biennial report, pages 327 to 331, inclusive.

PROPAGATION.

On page 327, under this head, I recommended planting twenty feet distant each way. I still conform to this plan; but I have found it necessary, after about fifteen years' growth, to remove every other diagonal row. This will give the trees a distance of twenty-eight and one fourth feet. The closer planting will pay to do this.

DISEASES.

On page 330, I would add that the only trouble we have had thus far is the black scale. The remedy I have adopted will be found on page 36 of the report. On the subject of olive culture generally I refer to pages 13, and 417 to 424, inclusive, 517 to 534, inclusive. This latter article was written by F. Pohndorff, who has published a memoir on the subject with various illustrations. The book is on sale in San Francisco. Adolph Flamant has also published a pamphlet with various illustrations, to be had at Louis Gregoire & Co.'s, 6 Post Street, San Francisco. These two pamphlets are mostly translations from European works.

I make this observation with regard to varieties and names—that so far as my experience goes, no two authors in the French, Spanish, and Italian works agree as to names; so without further knowledge than the mere translations, no reliance can be placed in them.

The Mission olive, the one I have propagated, is a rapid grower, well adapted to our climate. It will grow in almost any kind of soil if well drained. The tree is well shaped. The berries make good oil—the fact is, I defy the world to excel mine. The quantity of oil I have made from one acre exceeds the statistics given in the various tables. The variety called Picholine, which is being grown in various parts of the State, I know nothing about. It is only after a test is made that its merits can be fully known.

I would recommend to all those who now begin the business, to get a few trees of as many varieties as possible, so as to determine in the near future what would be the most profitable to plant. The olive will thrive and do well in almost every part of California, and, while there may be fruits that yield better incomes, no tree offers so much and so certain as a permanent investment. Oil making cannot be overdone. The demand for good olive oil, at good prices, must increase more rapidly than the production. But those who embark in the business must remember that no trees require greater care to insure profit; and as to oil making, a fine grade can only result from knowledge and extreme care.

In olive growing we are independent of high priced labor; the picking being done in the winter time after all other fruits are gathered. We are, comparatively speaking, independent of the freight question, as the value is great in small bulk. The fruit is not perishable.

MR. COOPER: I expected to add to these notes, as Dr. Agard, of Auburn, promised to give me the different bearing qualities of the Mission and the Picholine, as he has them growing of the same age in the same orchard at his place. I have not heard from him, and, therefore, cannot speak as to the quantity of berries on trees side by side of the same age, nor as to the time of ripening. Some claim that the Picholine ripens earlier; if that be the fact, and in other respects equal for all purposes, there would be an advantage of propagating the Picholine. But, so far as I have been able to learn, where the two varieties are grown in the same neighborhood, there has been no difference. I have visited, since coming to Santa Rosa, the hills of Captain Grosse of this place, where he has probably five or six thousand trees, two years old from planting, and I must say that Captain Grosse deserves great credit. He has conferred a lasting boon on the people of Santa Rosa, clearing land that, to my eyes, was absolutely worthless, and planting olive trees. These olive trees on the ridge of the hill are probably not more than from five to ten rows wide, following the shape of the hill, and in that respect there will be a great advantage in regard to

insect pests, because they will have better circulation of air and more sunlight, and on that account there will be much less danger of insect pests.

I have growing on my place olive trees in the black adobe, in deep bottom land, in sandy land made from the wash of the mountains, in stony hillsides and adobe hillsides, and in table land where the subsoil is probably twenty feet deep, dark clay, and, so far as I have known, there is no difference in the bearing of these trees or in the oil made. At the same time I do not recommend planting any kind of trees where there is a deep, clay subsoil; for it is doubtful if all trees will do so well in such soil. The only test I have ever made in regard to the quantities borne by an orchard—that is, taking all the trees—showed one hundred and twenty-two pounds of olives throughout the orchard, large trees and small trees seven years old from the cutting—one hundred and twenty-two pounds of olives from seven-year old trees from the cutting. The best result in making oil has been ten and fifty-five hundredths pounds in one large bottle of oil; the poorest result was twelve and one half pounds. I could not say whether this was caused by the different years or by less care in drying. We dried these olives altogether by artificial heat, and possibly the best result was because I gave the drying my own special attention. But we have for the tree seven years old at least ten bottles of oil, and those bottles will sell readily anywhere and everywhere at \$1 apiece. I was compelled to put the price up to \$2—\$24 a case—to keep my customers from quarreling about it, and I am sorry to say they quarrel all the same. I ought to have put it up at \$5 or \$10, so it would have been then a question of money, but I did not wish to do that, and as soon as I shall have a large enough crop I shall put the price at \$12 a case—\$1 for a large bottle of oil—and that is profit enough for an olive orchard.

MR. GRAY: How much do you dry your fruit?

MR. COOPER: We judge more by the feeling than by any other mode of test. In picking, the olives must be picked with care, so as not to break the skin, and in drying at a heat over 120° Fahr., it requires twenty-four hours, and by putting the hand in among the olives you see they all feel greasy, and in squeezing they are more or less spongy, a sufficient amount of water having evaporated to allow the liberation of the oil. They have practiced this method since the time of Genesis; that is when olive-making is first mentioned. In the earliest history of the race they never attempted to make oil without drying the berries—at least there is no record of it. I have never made the attempt, and I doubt whether olive oil can be extracted from the berries without first drying them, to evaporate portions of the water. A good deal more heat is required in the early part of the season than later in the spring. We commence picking in December, as soon as the olives turn a purple color—some of them probably only a reddish color, one side partially green—but they are ripe enough for making oil. They require more drying than they do in the months of March and April, when the water will have evaporated mostly from the tree, when they are hanging from the limb. That, of course, has to be governed by an intelligent person managing the drying. It is supposed that the oil is of a lighter color made earlier than it is later in the season, but as we make it all in the same tank, I do not apprehend that there is very much difference as to the color of the oil, nor as to the quality. In Europe they dry the berries almost altogether in the sunlight. In the coast counties here that is impossible, because we may have a series of foggy days during the process of drying, and then it would be impossible to carry on the work.

A DELEGATE: At what age do you commence pruning?

MR. COOPER: We commence pruning in the second year, or the third

year. In planting a cutting it is better not to disturb any limbs or branches that grow, because cutting when the tree is young interferes with the roots, and you will understand that if you cut away the limbs and destroy the leaves, you are destroying the breathing apparatus of the tree, destroying the root. An untrimmed olive tree, when small and commencing to root, will grow four times as fast without pruning as if you prune it. The more top it has, the faster it will grow, for it feeds very largely from the leaves, from moisture. After the second year, though, you want to prune. Those that cultivate the limb up to five and a half or six feet must, of course, pinch off all the branches that are making wood rapidly, so as to force the strength into one main trunk; and where lateral limbs branch out, pinch them off at the end, and stop the growth in that limb. But all small branches should be left alone as much as possible until the tree gets eight or ten feet high, and then commence cutting them off, until you get up to five and a half or six feet. Those who want to prune low can start out from four to five and six inches from the ground, and form four or five trees instead of one. I am not in favor of low pruning of the olive trees in the coast counties. We have no fear of sunlight burning the bark, and in ten years you can get twice as much tree with high pruning as you can with low pruning. It grows up to a bush more than a tree, and these shoots vie with each other to get up to the sunlight, while if you pinch them up to four or five feet, you can form a tree much better.

DR. KIMBALL: Does the tree sunburn?

MR. COOPER: I never saw an olive tree sunburn. I have never seen it in the hot valleys, where the thermometer is 110° in the shade during the summer.

MR. WOOLSEY: Have you ever found anything beside the black scale on the olive?

MR. COOPER: I never have. There are a number of insects mentioned in the French book, but I have never seen them in California to my knowledge.

MR. WOOLSEY: We have an olive tree in our garden, and a very beautiful one, and I have found that it was bored thoroughly with the twig-boring beetle. I never found them so thick in the pear as I have in the olive.

MR. COOPER: That was probably the oak-borer, and likely the surrounding oaks were burnt off, and they had been driven down to the olive tree.

MR. TOMPKINS: Do you thin out the head of the olive tree at all to let the sun in?

MR. COOPER: It is not necessary in California. The olive tree is a very rapid grower, and in pruning you have to do exactly the opposite. The theory of lopping off the perpendicular branches, as advocated in the French book by all the authors, so as to allow the lower limbs to bend out and give sunlight to the interior of the tree, is not needed in California. These limbs would all overbear, so that they would break off, and while the tree is rapidly growing, the outside branches, as soon as they would get full of fruit, would bend out, and touch the ground if you didn't prop them up. There is no necessity of inside pruning in a small tree.

A DELEGATE: Does the tree overbear?

MR. COOPER: The tree overbears in those years.

A DELEGATE: Is thinning practicable? Have you ever thinned at all?

MR. COOPER: No, I never have; I have endeavored to cut them so as to save the fruit and make just as much oil as possible.

MR. GRAY: Can you give a description of your present crushing process?

MR. COOPER: It is described in the biennial report. For the last two years I have adopted the same method that is used in Europe pretty gen-

erally, except that I have cast-iron rollers that travel around in the trough, instead of stones, connected by a horse, and a shaft inside, with cog wheels on, to turn it around. We put the dried olives in this trough four or five sacks at a time, and these rollers pass around, one after the other—there are two rollers in the same trough—until it is in a condition and looks as much like blackberry jam as anything else I can describe. Then we take it from that trough in that state, and put it into cloths, and we double them over and put slats of wood in between each cheese, so as to make aqueducts for the oil to run out. We pile them up five, or six, or eight, or ten, one on top of the other, and put them into the press and run the oil into the tub; from those tubs it is run into the tanks, and there it has to settle about four months. The oil being lighter, rises to the top, and we draw it off from the top.

A DELEGATE: Do you crush the seed, or do you guard against it?

MR. COOPER: You cannot crush the pulp properly without crushing the seed. I had some seeds sent to a competent chemist—one who is connected with the largest establishment in Philadelphia, and who is also a friend of mine—to test. He found nothing in the seed that could do any possible injury to the oil. In the olives that I have there is not one seed in fifty or one hundred probably, that has any kernel. The kernel is supposed to be mostly prussic acid, and much of that in the oil would injure it.

A DELEGATE: What size would you recommend planting the cuttings?

MR. COOPER: We plant them about fourteen inches long, from one inch in diameter up to two and one half inches. We also make cuttings three quarters to an inch; these cuttings we plant in the field where the tree is to grow permanently. We plant diagonally—that is, the top to the north—to keep the sunlight as much as possible from cracking open the limb that is exposed. We put the cutting about ten inches deep at the foot.

A DELEGATE: Do you saw off the cuttings?

MR. COOPER: We saw the cuttings off with a sharp saw, so as not to injure them. Some have painted or waxed the top, which is a very good plan; I never did. We take the cutting off as soon as we pick.

A DELEGATE: At what age would you transplant from the nursery?

MR. COOPER: Well, my transplanting of small trees has not been very successful, probably from want of care. The trees I plant out from growing in the nursery are as thick around as a chair leg, say an inch in diameter, and some of them are ten feet high. The olive trees that I am going to move in the spring I trim off like a cane four feet high, leaving nothing but a stake, and those that have a good root are sure to grow.

A DELEGATE: How far apart do you plant in the nursery?

MR. COOPER: Just room enough, say six or eight inches apart and the rows five or six feet apart, so that you can work them with a horse. In the nursery we work them every week or two; they require the same care as to grow any vegetable.

A DELEGATE: Do you irrigate?

MR. COOPER: I never irrigated anything on my ranch. I recommend, however, in planting cuttings out on high land, that they had better be watered twice during the season, and the water can be carried in a wagon. I give them about twenty gallons. Generally, when I have watered cuttings, I give about ten gallons at a time to each cutting, and water them twice. Captain Grosse says he has not watered his, but they are all rooted plants.

MR. McDONALD: Do you think Captain Grosse's will do well without irrigation?

MR. COOPER: I think they will. Those that are growing amongst rocks;

the rocks are so thick that there is no chance for any weeds to grow in between. If the ground were tillable, we might have mustard, tar weed, and nightshade, and everything else to kill out the olives; but there among the rocks he has the advantage of all these weeds.

A DELEGATE: Is a cutting an inch in diameter more desirable than one a quarter of an inch?

MR. COOPER: Yes, sir; nurserymen will prefer an inch to any other size—an inch to an inch and a quarter or an inch and a half.

A DELEGATE: What percentage of yours die?

MR. COOPER: I planted out an orchard last winter of over twenty acres, and I think there are not twenty that are not growing nicely—that is, cuttings set in right from the tree.

A DELEGATE: Did you water them before they started?

MR. COOPER: We watered about the time the ground needed it, without paying any attention to the growth. Some of them had started, and some of them had not started. I had cuttings planted out in March that are four feet high.

A DELEGATE: You advise rooting in permanent rows rather than putting in nursery rows?

MR. COOPER: No, sir; I do not advise it. It is more convenient for me to do it. I plant some in the field and some in the nursery. Where they failed to grow in the field, I substituted trees the following year. It is a very good thing to plant in the field after you have the ground carefully prepared. Plant the cuttings out in the permanent place, and plant a number in the nursery, taking good care of them to make trees to plant where the others fail, and then you have an orchard that is pretty nearly the same size.

A DELEGATE: How much preparation was made in this orchard here that you have spoken of?

MR. COOPER: The preparation here was very great. It was all grown up with bushes, and shrubs, and trees, which were all dug up and dug out by the roots; no better preparation of the soil could be made than that it was all completely thrown up.

A DELEGATE: And plowed?

MR. COOPER: No possibility of a horse getting in there; it was too rocky. It was dug over very thoroughly, and most of the grass killed. In some places, where there were little plateaus, and where there was very little rock, the fields were plowed. If this experiment proves a success, it will demonstrate that there are thousands of acres here on the hills, now supposed to be worth nothing for any purpose, that can be used for olive culture.

Let me say a little more in regard to the insect pests, or of the black scale. It is necessary to commence when the trees are small. They should be gone over in the month of April, certainly not later than the tenth of May, and every little tree should be examined; and wherever is found one of these black scale, they should be picked off by hand, and in that way prevent their propagating on the tree. There is no way you can keep the scale in check so easily, so cheaply, and so surely, as by picking them off by hand when they are small; and then if some trees happen to get a good many on, I would thoroughly wash that tree, using a hand syringe with whale-oil soap, or a decoction of tobacco, or caustic soda—one pound of caustic soda to four gallons of water. It would not pay in such a small way to make a kerosene emulsion, so as to be sure not to let the insects start in the orchard. I will read you a report I made to the State Board of Horticulture several years ago, on the subject of the insect, to show you

the danger before you: "The olive is a rapid grower, bears abundant crops; it would seem to be the tree of all others that should claim the attention of the people, and its planting be encouraged. There is yet, however, much to learn to enable the grower to keep his trees from the black scale. No other tree seems to yield so readily to the attack. The increase is so rapid, and the insect is so persistent, that it is yet a question whether, in large areas closely planted, it can be kept in check at a cost that the fruit will warrant."

I have no modification to make of that caution. I have spent probably a dollar to a dollar and a half a tree each year in fighting the black scale, and can only barely keep it in subjection at that. This black scale seems to have been created for the olive, to make us careful, energetic, and persistent, to keep us at work. While one washing each year with the kerosene emulsion will keep an orange tree, a lemon tree, or a lime tree free from the black scale or the soft orange scale, the olive tree requires two or three and four washes to have the same result. My orange trees are just as clear and clean—that is to the naked eye, apparently—as those grown at Riverside, where they have no black scale at all. Of course there are insects there on the inside, but they are easily kept down by washing with the kerosene emulsion once a year. On the olive tree I confess I do not know yet the proper time of the year to do this washing. For two or three years we have had so much rain in the winter time that I could not get on the ground. Our wagons were so narrow in the tire, and the ground so soft, that there was no possibility of getting a washing apparatus over the field, but now I have wagons made with the tires six and eight inches wide, so as to be independent of the soft state of the ground; and this winter I am going to practice, in the month of December and in February, washing with the kerosene emulsion, to see whether it will not be more effective than it has been washing later—in April and August. The insects commence hatching in June, and if they would all hatch out in June it would be an easy matter—or if they would all hatch out in July—but I have known them to hatch as late as the month of February—and while simple washings will kill the little ones after they are just hatched, it will not affect those that are half grown. If you defer the washing until after they are all hatched, the first hatching is more than half grown, and has already formed its shell and affixed to its place. That is the great difficulty with the black scale; it has but one brood a year, but that brood takes four or five or six months to appear upon the scene.

A DELEGATE: Does this particular black scale exist upon any other trees?

MR. COOPER: It commits great depredation on the walnut in the coast counties, and I have grave doubts whether the apricot growers upon our coast will make a success unless they wash the tree; but wherever there is an olive tree, there you will find it.

A DELEGATE: How do you apply the spray?

MR. COOPER: We use the San José nozzle, mostly, because it is most convenient; but we discard the little tin with the opening and substitute India rubber, so that, if the sediment not properly drained gets in the material with which you are washing, it causes the rubber to expand a little and let it out. That is the best spraying apparatus that I have seen yet—a San José nozzle with a rubber diaphragm which takes the place of the little brass plate on top.

A DELEGATE: What are the cuttings worth?

MR. COOPER: I have been selling them for five cents apiece, one inch in diameter and fourteen inches long. The smaller I sell two for one—that is, two and a half cents. That is the price they generally sell for in

Southern California, packed and put up in the proper manner, and put on the wharf for shipping. Thinning out gave me a large number of cuttings last year. I thinned out one whole orchard that was fifteen years old; I have another fifteen years old that I shall thin out partially this winter.

A DELEGATE: You disinfect the cuttings?

MR. COOPER: I disinfect everything. There is no trouble about the cuttings.

MR. DWINELLE: You have a peculiar apparatus for picking?

MR. COOPER: Yes; I use a common ranch wagon, with a platform on it that reaches up to the limb, and I drive on one side of the tree as close as the platform will permit, running under the tree so that the pickers can stand and commence to pick the lower limbs, while others can stand higher; and then we have ladders fastened with iron bolts that lay up against the tree. We have that apparatus fastened to a canvas cloth that buckles around the body and goes around the neck with clasps, making something like a scoop, so that these pickers can pull the berries off with both hands. We do not care about having some leaves in with the olives, because we pass them through a very powerful fanning mill—the largest fanning mill we can get for cleaning grain—to blow the leaves out; and doing that will take all the dirt out, and the olive comes out of the mill perfectly clean, ready for the dryhouse. The pickers come in at night with the day's picking, and the first thing in the morning we have that cleaned and put in the drying house. With a fair crop, averaging the whole season, a picker will average three hundred pounds per day, so we calculate that as a day's work. I do not hire Chinamen by the job; I have them by the day, and my pickers all make a pretty good average. I tell them if they can't pick that many they will be discharged. They know we know how many a man can pick—an able-bodied man can pick three hundred pounds a day. We pick them clean from the tree. Beginning with the ripest tree and taking the others later, we take everything off—pick all the olives that are on the tree, green, red, and purple. If there are any green ones on it we finish them up.

A DELEGATE: At what stage of ripeness should they be picked for pickling?

MR. COOPER: There are two theories. Some say before they turn red, others when they are entirely purple. For the pickling it is better for the ripe olive that they turn a purple color, but they have to be picked with great care and handled with great care. We pick them in water; that is, pick them and drop them in water, so they won't be bruised, and we take into the field a tub with water in it and the pickers empty into that, so that there cannot be any bruising. Even in pickling them we handle them in the same way. Every day we handle them we handle them in water, and we aim when we are changing the water to get the olives that are in the bottom one day on top the next, changing the water every day, and in that way you will not find one that is imperfect.

MR. GRAY: How much salt do you put in?

MR. COOPER: We buy the best Liverpool salt, and boil. The first salting, after changing the water every day for thirty or forty days, according to the ripeness of the olive, we make a mild brine about half as strong as would bear an egg, and leave it in that brine two or three days. Afterwards take the olives out of that brine and wash them in cold water. Then we make a brine that will just about bear an egg, boiling the brine, and in that keep them for an indefinite period. I have kept them three years, and every olive that comes on the table is just as perfect, just as full, as when picked from the tree.

A DELEGATE: The first washing is in clear water?

MR. COOPER: Yes, sir; we do not wash, we soak them—keep them in water thirty or forty days, changing the water every day.

A DELEGATE: You do not use lye?

MR. COOPER: No, sir; I never did. I never tried that method, though some do.

A DELEGATE: How far apart do you plant the trees?

MR. COOPER: Twenty feet each way.

A DELEGATE: Which do you consider the most profitable—pickling or making oil?

MR. COOPER: I am prepared for making oil, and have only pickled a few. I should think there was more profit in pickling on a small orchard, but where you have six or seven thousand trees in bearing you have enough to do without trying to pickle.

A DELEGATE: Is the refuse, after you have taken the oil out, of value for any purpose?

MR. COOPER: I have never made any use of it excepting to feed it to pigs. It makes excellent pig food. They use it in Europe to make what they call a third quality of oil. They pour it in a large vat, pour boiling water over it, and it ferments, and the oil that is left is then liberated, comes to the top, and makes a very good oil for burning.

A DELEGATE: Do you think there is more profit in olives than in any other fruit?

MR. COOPER: I couldn't answer that question. All I can say to the audience is that I am planting olives and not planting any other kind of fruit trees.

MR. BUTLER: I have a place near Dr. Agard's, of Auburn, and I have some two hundred of the finest six-year old trees. The conditions may be somewhat similar to Dr. Agard's. Mr. Cooper speaks of a comparison between the Picholine and the Mission. So far as I am concerned I would give a preference decidedly to the Mission. They commence bearing about the same age, and while there are not many more on the Mission, the Picholine are so much smaller it gives a decided advantage to the Mission. The Picholine may be slightly earlier but not much. I think the Mission is decidedly better.

MR. KLEE: From seeing the Picholine in different parts of the State. I was impressed that it ripened five or six weeks earlier than the Mission. I think that I found it to be considerably earlier in Placer County, but of course Mr. Butler speaks from his own experience. Mr. L. A. Gould, of Auburn, sent me word that they ripen five weeks earlier than the Mission—ripe enough to make oil five weeks earlier than the Mission. While I am speaking about the Picholine, I would like to call the attention of everybody to the fact that it is a very small olive. The impression has gone abroad that it was a very large olive, and a great many people, Mr. Butler among others, were deceived into buying it, thinking it was a large pickling olive. It is not so, nor should the true Picholine be a large olive. In Pomona I have seen the Picholine, and Mr. White, of that place, thinks quite favorably of it. He claims that although much smaller, it bears fully as much as the Mission; and that, owing to the more even ripening, it is easier to gather. It comes off the stem quite readily, and a man can very quickly strip the limbs of the olive. That is his experience there.

MR. FLACK: I have been trying for two years to raise the Mission olive from cuttings in the nursery, and I have failed to find any method by which I can get more than ten to twenty per cent to grow. Those that have grown are from five to five and a half feet high. My cuttings were

from half an inch to a quarter in diameter, and they were placed on the finest nursery ground that you could find in Sonoma County. They were put out in December, February, and March, and as they have been sawed for some time, I took the knife and made a fresh cut, and they were on soil which would retain the moisture. I would like to know why I had not better success.

MR. COOPER: What was the nature of the soil?

MR. FLACK: It was what you would call a willow bottom with sandy deposit. It was in a perfect state of cultivation and pulverized.

MR. COOPER: It is necessary when you plant olive cuttings that the ground should be thoroughly cultivated. It should not be wet; it should be warm. It is useless to plant out olive cuttings in cold ground.

MR. FLACK: This would be what you would call real good melon ground. I cultivated it about two weeks to try to get it perfectly loose.

MR. COOPER: I am asked about what time would be most favorable for the propagation of cuttings. I have recommended from the twentieth of February, depending on the season. I have found in watching the season the last few years, that when we have considerable rain during the months of December and January that we were likely to have an earlier spring—that is, less rain in the spring—and in such a season I should plant them earlier. But, as we had two or three years ago, and I think two or three winters in succession, no rain till late in January, then the spring and summer rains lasted much later in the season, and necessarily would delay our planting. Under such circumstances it will not do to plant in March, or they will all rot.

The hour of adjournment having arrived, a recess was taken until the afternoon at two o'clock.

AFTERNOON SESSION.

FERTILIZATION OF ORANGE ORCHARDS.

Essay by A. SCOTT CHAPMAN, San Gabriel.

Having had experience only with orange orchards, I will confine my remarks entirely to them.

The present outlook for the crop in the southern part of this State is not large, but the fruit is of larger size and better quality. But in those particular places which have been called to my notice, where they have fertilized, the crop is heavy. Peculiarly is it so in Riverside, where these people deal in corners in sheep manure and commercial fertilizers. The effect of the fertilizers on the Australian Navel in our orchard is very marked, for it generally happens that there are on this tree a great many oranges that do not develop the proper characteristic. This year the stamp of the fertilizer is plain.

HARDPAN.

In many orchards of the State, we hear of the formation of hardpan. It is my observation and study that if the people would do less cultivating and plow under vegetable growth, that they would receive much better results; and this, with an occasional liming, will prevent any hardpan from forming. The objection to this in the southern part of the State, is that the weeds, if allowed to grow, would pump all the water out of the

soil, and that the trees could not live through the summer. To such, I can only answer: irrigate. We have walnut trees on our place at San Gabriel that we have not plowed for two years, but we have thoroughly fertilized them, and never before did they bear as many and good a crop as this fall, and I may say the same of our lemons. And again, we have a particular plot of about five acres in our orchard where we have not allowed a weed to grow, cultivating after each irrigation; but this orchard was fertilized with sheep manure at each irrigation, and limed last winter at the rate of ten barrels to the acre. These trees will average twelve feet in diameter and fifteen feet in height. They are literally covered with fruit, and will average six boxes to the tree.

SULPHATE OF POTASH VERSUS MURIATE OF POTASH.

Muriate of potash, no matter what its strength, may answer well enough for clover, grass, corn, and ordinary root crops. But it is objectionable in respect to sugar beets, tobacco, and potatoes. The chlorine in it hinders beet sugar from crystallizing, and in some soil tends to make potatoes waxy rather than mealy. It impairs the quality of tobacco leaves to such an extent that they command a lower price than would have been the case if another kind of potash had been used.—STONER.

Mr. Mapes, of New York, manufacturer of Mapes' manure, claims that it is superior in every way, in that the chlorine of the muriate unites in the soil to form chlorides, which are poisonous to most plants; whereas the sulphur in the sulphate unites to form sulphates, such as plaster, things useful to vegetation.

I call your attention to these facts, because at present on this coast the muriate of potash is used in artificial fertilizers.

MR. HATCH: In regard to the care and cultivation of fruit trees, I would like to say, in my opinion there is too little care taken of the trees and too little cultivation done as a rule. In fact, my opinion is, that in many places where irrigation is deemed necessary, where there is plenty of rainfall, that it dries out for want of cultivation, and that if there were thorough cultivation there would be much less necessity for irrigation.

MR. GREGSON: Being here in this country since 1850, I have been incessantly in the fruit business and potato raising, and so far as fruit is concerned we have generally been successful; we are not troubled by any of your scales. I was very glad to hear of the remedies here for this awful thing should it strike this part of our beautiful State. We are bothered a little with an imported article, which is the codlin moth, and this year, being an old man, not much able to work about the labor, I gave my attention early in the spring to fighting the codlin moth in the old fashioned plan, as Mr. Cooke of Sacramento recommended to fight it, to wrap a cloth around a tree, and go every ten days and find the codlin moth and destroy it. The success of it is shown in my orchard by a good crop of winter apples and no codlin moth. The codlin moth has generally been our worst enemy. Now, sir, I am glad to know that the State Board of Horticulture has seen fit to come to Santa Rosa and Sonoma County; you are talking to men here to whom you are doing a great deal of good, and it is thoroughly appreciated. I feel that it is good to be here and to listen to your intelligent advice as how to save our country from this calamity. I have been very much interested in reading the reports, but I did not think that the State Board of Horticulture consisted of practical men right from the orchards, endeavoring to benefit the people. I am glad to see you are, and I wish you success, and I hope that the State will continue to give its patronage to such an able body of horticulturists.

The Secretary read a letter from H. C. Ford, of Santa Barbara, President of the Santa Barbara County Horticultural Society, as follows:

SANTA BARBARA, November 4, 1887.

ELLWOOD COOPER, Esq., *President State Board of Horticulture*:

DEAR SIR: Some time ago your Secretary intimated to me, that if the people of Santa Barbara so desired, he thought our city might be chosen as the place of holding the State Convention of Fruit Growers, in April, 1888. I brought the matter before our Horticultural Society at our late regular meeting, and after a unanimous expression of sentiment in regard to extending an invitation to your Board to meet here, I was appointed to confer with you, and have you present this invitation in behalf of our Society, and the citizens of Santa Barbara, promising that if Santa Barbara is chosen as the place for your next meeting, that the Society, and her citizens, will do all in their power to render the same the most successful meeting of the kind ever held in the State.

Very respectfully,

H. C. FORD,

President Santa Barbara Horticultural Society.

GENERAL M. G. VALLEJO: I do not know if I can say anything as to the letter just read. I have been quite ill for two or three days, but I must say a few words about Santa Barbara County. I have known, since 1822, all the coast from Gaviota, as we call it, to San Buenaventura. In times gone by we had in Monterey a big lawsuit, and a brother of mine was in charge of it, and he took me down to Santa Barbara. I remember quite well, though I was only thirteen years of age, but large enough to remember everything, and I verified my ideas afterwards. When we reached Santa Ynez, which seemed to us at that time a very long distance from Monterey, traveling as we did in those days from one Mission to another on horseback, carrying home-made biscuits on our horses. We went to Soledad, San Antonio, San Luis Obispo, then to Santa Ynez. We rested there at a big mountain—it was a big mountain then. Now it is no use to talk about big mountains, for holes are made, and they go through them. That is nothing now; but then we rode up on a mule, and it took half a day to reach the top of the mountain, going down the same way. I reached a big ranch there by the name of Rancho de los Ortigas, or Refugio, as it is on the maps, which property was bought by the pirates in 1818—they bought the whole thing. In 1822 we stayed at the house of Dolores Ortega, in a little ravine, or little valley, called Tayigasas, which is now owned by Mr. Emile Hill, of Santa Barbara. He was a real full-blooded Yankee. He came in the schooner with my brother-in-law, who owned the land near the Salinas Valley, near the Refugio Ranch then, and in Santa Barbara County now. We found there about four acres of vineyards, and they made wine and raisins—what we called dried grapes—and he had a dozen or so of very fine orange trees. That was in 1822. At that time there were oranges near Santa Barbara, and there were oranges at Santa Barbara—at the yard of the Commandante, Don José de Noriega. He had several trees there at the military post. I was there in the month of April, and about one hundred of my relatives gave me a picnic in the old-fashioned style. San Buenaventura had plenty of olives and oranges, too, at that time. Now, Mr. President, Santa Barbara was unknown by our people, because that range of mountains took everybody back except those who came by water; but now there is a railroad, which comes by way of Newhall, into Santa Barbara; and the other day they got to the ranch of our honorable President, Ellwood Cooper. That unknown business is a thing of the past, for there is another road to Paso Robles, and which is going to meet them at that place. Well, Santa Barbara now is a very important county—not so large, not so abundant with hundreds of leagues of soil, but a rich,

good climate, plenty of oranges, plenty of olives, good pears, potatoes, and everything else—and, beside that, a good, gracious people.

Mr. President, the question in this Convention is now, if I understand the reference in the letter, that the next Convention be held in Santa Barbara in April. There is no use to talk much about it. I would be glad, if I was a miraculous man, to inspire everybody in this Convention to vote with me to go to Santa Barbara with us next April. In the early days when I was there all that was to be seen was the old Presidio, the old Mission on the hill, the house of Don Carlos Carrillo—an adobe and tile house—the house of a first cousin of mine, and three or four houses that were outside of the old square, and one or two at the old fort.

Now, sir, I went there afterwards; I went there the other day. I was met at the wharf by a young man, the owner of the Arlington Hotel. "Is General Vallejo on board?" were the first words I heard. He gave me a card and said, "Here is a carriage at your disposal, sir." I didn't know anything about it, but I didn't mind. So I went there, and after I had stayed at this magnificent hotel, the Arlington, a day and a night, I went to the counter to pay. "All paid, sir," the clerk said. "Who was the invisible man?" I asked. "Well, I received a letter from Los Angeles, to the owner of the house, to keep you any time and all paid." So I was not very glad, for I always pay my expenses; but in coming out of the flower garden in front of the hotel, which is very pretty, I found there a young lady of fine appearance, and she called me uncle. I said, "Who are you?" "Well, you are Uncle General Vallejo." Well, I didn't deny it; so I gave her my arm, and coming down a little bit, I hunted for the old fort and for the old people, and I didn't find anything in there but the old church of the Presidio, which is now of brick instead of adobe. It didn't suit my eye, but at last I came to the house of Don José Noriega, as they call it there. So in going around the first corner I found four nieces. Uncle here and uncle there was all I could hear, and going on a little further I found the house of Don Pablo de la Guerra, whose daughter is the wife of Mr. Dibble. I found eight or ten nieces all around, and I had a very fine time; so I stayed there about eight days hunting for old reminiscences. I remembered an adobe here and there. Now, nothing but nice houses are to be seen, fine streets, post office, groceries, and apothecaries, notaries, and a devilish good pile of lawyers, too. I walked down to the beautiful house of Mr. Dibble to see a great panorama; that is, it appeared that way to me. Steamers pass daily by the Santa Rosa and Santa Cruz Islands. Now Santa Barbara is well known, and I move, Mr. President, if it is in order, that the next Convention in April be held there, and that all those interested in horticulture go down to Santa Barbara and establish the real fact that Santa Barbara produces everything. Last April I went as far as Mr. Hollister's, and as far as Mr. Cooper's farm, and it looked like a glorious place. He gave me a nice bed and a good ride in a nice carriage, and I saw the whole thing; and it was so familiar to me that sometimes my tears came out, and I couldn't help it. I think you are all young here that belong to this Convention; but the old fellows that belonged to the Bunker Hill, for instance, they would go back there and see the grounds when they had been to Salem, or to Cambridge, and they cried. So I went to Santa Barbara to study my old times, and I cried. I say with gratitude, and with everything, Mr. President, and members of this Convention, if you have good hearts, vote for Santa Barbara, and I beg you to do it; and I think I have a right as an old person in the settling of this country, one among the early families, who can also enumerate his relatives that are in Santa Barbara, and they and all the new people now in Santa Barbara I

know will welcome you; and one of the best of Santa Barbara's citizens, sir, is the President of our Convention, Don Ellwood Cooper.

A delegate suggested that the printed programme contemplates that the selection of the place for the next meeting should be made just before the adjournment of this Convention, and that it would be better not to deviate from the programme, but to defer the selection until that time.

GENERAL VALLEJO, continuing: I did not intend to interfere with the regular order of business, but the letter just read brings my blood up and excites me a little, and the gentleman will excuse me. I ain't very passionate, and I feel always disposed to do good; and if you know General Vallejo personally, absent or at home, you will find him always right. Now, I made those remarks about Santa Barbara because I couldn't help it. I am now an American, and it is because of my good disposition toward the Americans. I remember when there came to my house, in Sonoma, Sir George Simpson, Governor of India; Governor Douglass, and Governor McDougal, with all their retinue, in 1838 and in 1841, and they asked me if I would work for the protection of England. They said, "We are here to help, and we have steamers, Commodore so and so." And I told them this: "That I be hanged if I accept any European power to keep this country." And Mr. Leese, a brother-in-law of mine, was a witness of that. "That if we Californians have a chance to beat our own flag against Mexico, we'll be a State, or an independent province or kingdom; that we belonged to the American continent, and were opposed to European crowned heads." That was my answer to Sir George Simpson, Governor McDougal, and Governor Douglass. They were at my house about a month and a half, with a whole retinue, and further, they had no bills to pay. Afterwards, French Consul John Gascet, a Frenchman who was in Monterey, and another who was in Los Angeles, came to me to ask the protection of France, and I gave them the same answer, and a little harder, because they understood Spanish, and I had a chance to use my own tongue, but in a decent way, but sharp all the time; so they went. But, fortunately, afterwards I had a conference with the Consul in my own house. We talked matters over, and we made things right. Just coming from Monterey in April or May, all my troops in the frontier here were fighting with my nephew, Alvarado, who was the Governor. And José Castro was a nephew of mine, too, and the whole country there were my relatives—uncles, cousins, nephews, and nieces, and everybody. We fought against each other. Governor Micheltorena said, "How long are you going to fight?" I said, "I don't fight any longer with my own people." And so, in my house, on the fourteenth of June, about six o'clock in the morning, and a very nice morning it was, I heard hallooing, and I didn't know what it could be. There were gates at my place with big locks, and they were so high that I could not see what was going on; and about the first thing I felt was a big rifle on my breast, and another, and another, and another came at me with a knife; and so I was forced to surrender. And I was forced to say to them: "Gentlemen, I am not in the fighting business; you take me; however, it is hardly fair play." So I surrendered myself, and we began to talk. And I saw from the window a piece of cloth representing a flag; the colors were white and red, and in the center was the picture of a bear. This was the bear flag, and these are the facts and the history of the bear flag. I made no tussle over it. I took things philosophically. The grand project of mine was not to go independent. I said, "California must go to the United States, and work with them." So they took me on horseback, and put me in the calaboose at Sacramento; and when I was freed, I came home. Mrs. Vallejo gave

me a little bag to be placed on my saddle, and in it were pistols. I then became armed, and assumed my position as General.

MR. GREGSON: Mr. President, with your permission, I would like to say a few words of what I hear. I am a personal witness. Such a sight you will perhaps not see if you hold your Conventions in any other part of California. What you hear the General say is correct. Oh, how I remember the time that I escorted that man, with my old fashioned rifle on my shoulder, over the plains of Sacramento when we had him prisoner there. I was not in Sonoma when we took him. I was there on duty at that time, and well remember Jacob P. Leese, the last man that he has spoken of. How vividly I remember them—excuse me, Mr. President, for it may not be in the line of the business of this Convention—but a few more years and the General will soon pass away, and so with the private soldier, for that I was at that time—he a General and I a private soldier—and so we treasure up these things. Go to Santa Barbara; if I have a word to say, I would say yes. I remember once of being in Santa Barbara with about half a dozen American soldiers, I amongst the rest just returning from Fremont's campaign through that country, and at the Mission we were treated to a glass of olive oil made at the old Mission at that time, and he gave us a glass of wine, the grand old padre; he could not give us any wheat, he could not give us any bread, for he had it not; the tortillas was that upon which the padre lived—flour ground in the morning and in less than an hour baked and eaten. General Vallejo, we have met twice or three times since the time that I stood guard over him, and meet here to-day. I came here this morning ten miles from the westward to see and hear the close of this Convention; and I am glad, Mr. President, for this event of history is welling up in my heart equally as big as the General's. What changes have come over our country since that time! How wonderful it is! The American comes, and he comes with his wand, and nature's face is all changed. At the time that the General speaks of, we all came to the conclusion—Bidwell and every old Californian—that the Sacramento Valley was a wilderness and a desert, and was condemned by us. I well remember, Mr. President, when old Mr. Schwartz, a German who lived on the Sacramento River, produced potatoes; and he would bring potatoes to the fort and to the cabin, sir, as big as walnuts. Now look at it. The American comes and the face of nature is all changed, and the little potato is a big one. What a wonderful country! Fruit abundant, of which I have heard so much talk, was given up as worthless at that time, and now look at it. It is wonderful! And if I have a word to say, go to Santa Barbara. Yes, the old General will go there among his children and among his ancestors. I remember at the Mission of Soledad, when I was a soldier there, I told a little girl that I had stood guard over General Vallejo.

GENERAL VALLEJO: Stop a little bit—now stop a little bit. Mr. President, you do not see many scenes of this kind. He was one that put me in the calaboose, by necessity. He did not insult me though. I was under the depression of circumstances. I couldn't help it. What is your name?

MR. GREGSON: Gregson, sir.

GENERAL VALLEJO: By George! I remember you now. You was there. I remember you was there below Sutterville where the potatoes were no potatoes at all; but after the Americans came, that bear flag business was like medicine from a good doctor. He gave a tremendous emetic, and afterward that potato became bigger, and bigger, and healthier. Well, sir, I am glad to see you, shake [they shake].

The motion for the next Convention to meet at Santa Barbara was carried unanimously.

Mr. TOMPKINS offered a resolution as to redwood forests as follows:

WHEREAS, The rapid destruction of the redwood forests of this State will entail permanent loss to the beauty of our coast counties, and already threatens the water supply and consequently the fruitfulness and healthfulness of those counties; and whereas, the perpetuation of a large tract of coast redwoods will be of continuous economic value and of continued and increasing interest to science; be it

Resolved, That the Eighth Convention of California Fruit Growers hereby indorse the effort of the California State Board of Forestry in seeking to secure the reservation of such a tract of redwood forests, and recommend their protection to the earnest consideration of our Representatives in Congress.

The resolution offered by Mr. Tompkins was adopted.

Mr. GRAY, on behalf of the Horticultural Society of Chico, presented an invitation that the annual Convention in November next be held at that place, and Mr. Stabler, of Yuba City, presented a similar invitation on behalf of the city of Marysville, and the matter was referred to the State Board of Horticulture.

Mr. STABLER offered the following resolution, which was adopted unanimously:

Resolved, That the thanks of this Convention be hereby tendered to the Sonoma County Fruit Growers Association, the Board of Trade, and the citizens of Santa Rosa and Sonoma County, for their hearty welcome to this Convention and the generous provisions which have been made for the facilitation of business and the convenience of delegates.

The resolution was adopted.

Mr. McDONALD: I desire, in behalf of the fruit growers of Sonoma County, and especially of the ladies of Santa Rosa, to express in a very few words of gratitude the great pleasure that this Convention has afforded us. It has been not only an occasion of great pleasure, but it has been one of great profit to us, and we will long remember it, and hope that at an early day they may find it convenient to hold a Convention here again.

The business of the Convention here being concluded, on motion, an adjournment was had to meet in Santa Barbara, April next, the time therefor to be fixed by the President.

B. M. LELONG,
Secretary.

PROCEEDINGS

OF THE

NINTH STATE CONVENTION OF FRUIT GROWERS.

HELD UNDER THE AUSPICES OF THE STATE BOARD OF HORTICULTURE, AT THE CITY OF SANTA BARBARA, COMMENCING MONDAY, APRIL 9, AND ENDING THURSDAY, APRIL 12, 1888.

PRESIDENT COOPER'S OPENING ADDRESS.

LADIES AND GENTLEMEN: This will be the Ninth Fruit Growers Convention and the fifth held under the auspices of the State Board of Horticulture.

Our last biennial report contains the transactions of the Fifth, Sixth, and Seventh Conventions, besides the reports of members and the report of the Inspector of Fruit Pests. It is a work of very great value, and I again recommend it to all those engaged in fruit growing.

Our next biennial report will be issued in October or November of this year, and in addition to the reports of officers, will contain the transactions of the Eighth Fruit Growers Convention, held at Santa Rosa, as also this (the ninth) now convened. I cannot too strongly recommend to fruit growers the necessity of careful study of these reports; every branch of the fruit industry is therein discussed by practical fruit growers. Those who do not study and profit by the experience of others, will be left in the race for success.

I have noticed in the vicinity of Santa Barbara quite a number of English walnuts and other fruit trees being planted on land recently covered by live oak. These orchards can only result in failures, which the owners can ill afford. I call attention to an essay on the English walnut in the biennial report, pages 332 and 333; the precautions there laid down should not be disregarded until it is practically demonstrated that they are without any foundation. I have also been an eye witness quite recently to the losses which must be sustained by bad handling of fruit. Samples of the same varieties of prunes, peaches, and apricots were shown me when last in San Francisco. The one in demand at high prices, the other dull of sale at probably half price. Drying fruit successfully and putting it on the market in good condition, is the key to successful fruit growing. The discussions at the Santa Rosa Convention were more full on this subject than at any previous Convention, so that I call your attention to the same, and especially to the remarks of Mr. Hayden, of San Francisco, and Mr. Gladden, of Healdsburg. In Consular Report, volume 67, page 476, our Commercial Agent at Mayence says:

If you want dried apples, the American fruit is first offered to you, while a long string of adjectives are thrown off at you in praise of it. These apples are to be met with almost everywhere, and are preferred to all others, on account of the excellence with which they are dried and for their cheapness. For about three years past, may be four, American dried apples have been in the German market, and have met with great success, forcing the native product almost entirely out of its own domain. And it is really a remarkable accomplishment, that the Americans have been able to place upon the market a dried fruit which almost vies in freshness and flavor with the fresh fruit, and yet can be kept at long periods.

It might be appropriate in this place to ask the Convention, during its session, to pass a resolution asking our honorable Senators Stanford and Hearst to request the Secretary of State to forward to our office in San Francisco all the publications known as Consular Reports, for the use of the Board and fruit growers of California. Also a resolution instructing our Fruit Inspector and Secretary to formulate a series of questions for the Department to forward to the different Consuls relative to insect pests, and remedies. This important part of the requisite information to be gathered has been overlooked. In my examination of these books, which has already reached eighty-eight numbers, I have found only three or four notes touching insect pests. Volume 86, page 371, caterpillar plague in Cadiz, Consul Ingram writes:

For some three years past an insect of the caterpillar species, called *Lepidoptera*, of the genus *Liparis*, has made great havoc among the trees, principally the oaks and the larch. Fruitless attempts have been made to destroy the insect with sulphur, and other means. The Civil Governor has written and forwarded to the Secretary of the Interior, at Madrid, samples of the insect, with the trunk of a tree attacked, asking for Government investigation and aid.

Consul du Prè, of Salvador, same volume, same page, writes:

Through three months grasshoppers have ravaged narrow districts of Salvador.

New Zealand.—Consul Campbell, in volume 83, page 510, writes:

The importation of American apples into the port of Auckland is prohibited because of the fear of the codlin moth. My attention has been called to a new and quite novel mode of destroying this pestiferous and destructive insect, which, I incline to believe, is unknown in the United States. A plant called *physianthus* is recommended for planting in apple orchards. The plants twine and grow up the trunk, and spread through the limbs. It would not damage an apple tree to plant this near the root and train it up the trunk and through the branches. The flower is sweet scented, and the moths are attracted to it in great numbers, and, once in the flower, they become prisoners, never to get out alive. It may be that the plant is well known in the United States, but its use as a means of destroying the codlin moth, I incline to think, is not known there.

Professor Wickson, of the University, had a slip of one of these vines in bloom at the Convention at Santa Rosa, and explained its operations, and stated that the plants could be had at the University gardens by any one who was desirous of trying it.

Orange Enemies in Cuba.—I quote from Consul Pierce, volume 65, page 230:

The chief enemies of the orange tree here are the *gua-gua* (gow-gow), and *come-jeu* (co-may-heu). The *gua-gua* is a parasite of a whitish color that sprinkles itself over the tree. It may be driven away by putting powdered sulphur on the branches of the tree. I am told, however, that many years ago the attack of the *gua-gua* was particularly injurious to the orange trees of this part of the island, which largely accounts for the comparatively few trees now in existence. It seems that it is much less injurious than formerly. The *come-jeu* only attacks the tree when it is old. If the nest of this insect is found on a branch of the tree, it is well to cut it off and destroy it. I am told that it may be destroyed or driven away by putting soap, lye, and arsenic on the *come-jeu* and tree, and ashes sometimes put around the tree. I have never seen a *come-jeu* that feeds on the bark of trees, but I have seen a "house *come-jeu*," which is much smaller and much less objectionable, and it was to me a thing of considerable curiosity. It got between the roof and ceiling of a house, and worked through the plastered ceiling, and to the length of one or two feet on the side of the wall. It presented the appearance of a large-sized black twine string hanging on the wall. No one would ever have thought, except for the fact that it grew longer day by day, that there was animal life connected with it. It was brushed away with a broom from the ceiling down, but, nevertheless, it continued its growth day by day in the same direction. The black string was nothing more than fine dirt with a hollow in the center, in which the insect lived. This black string is their house, which they carry with them wherever they go. The *come-jeu* of the tree will wind around the body of the tree until the tree is often increased to apparently twice its size, withers and dies.

Fruit Culture in China.—In volume 51, page 585, Consul Wingate writes:

Oranges are the principal fruit raised in the vicinity of Foo Chow, and the small Mandarin has a reputation for excellence. I wrote to Mr. Tang Jui Fu, the proprietor of an orange orchard of some twelve thousand trees, which I once visited, asking for information upon the questions contained in the circular. I quote from his reply: "In my humble orchard, I plant only one sort, the Fohkein oranges; sweet in smell, warming in character; the outside of common use in the *materia medica*. There are those who plant the yellow Swatow orange; fragrant, and leaving no pulp in the eating. One cannot plant oranges in hill orchards. Even should one plant them, they scarce last a few years. On an open expanse of level ground one must raise hillocks two or three feet high, and plant the orange trees in the hillocks, sealing the roots in solid with mud, or using garden or field earth, as convenient, watering them daily. What they most dislike is proximity to sea and salt water. The method of planting is to plant the seeds; if grafted, they do not fruit in the winter season. Choosing the larger oranges, and waiting until the next year's term (clear, bright weather, April fifth), one plants the seeds in pots or garden, as may be convenient. After two or three years have passed, one transplants the seedling into the garden. Three or four years later they are fit to be transplanted to the hillocks in the open orchard. Another three or four years, and they may blossom and fruit. They are planted, as a rule, about twenty-two feet distant. If the orchard ground be rich and generous, and be constantly cultivated, each tree will bear four hundred pounds in good years. Orange trees bearing of lichens is through their being old trees, and not constantly looked after, resulting in their having this thing upon them. But this tree of itself breeds a bug which first comes to life on the surface of the forks; when larger, it bores and eats its way into the crotches; while outside, it is easily put away, but when it has bored within, one must hook it out with a copper wire. If this bug is not put away before it has eaten deeply, the tree is ruined. Still further, there is a sort of stinking bug (fine as down), that comes to life at the clear and bright term, April fifth; it devours the bud points. When summer begins (May fifth), it grows wings and can fly. In the slightly heated term (July seventh), it may weave its web."

The orchard of Mr. Tang is situated upon the bank of the Yuenfoo River, a branch of the Min. The soil is clayey loam. There were trees in it which he said were a hundred years old. By the yearly application of earth to the trees, the mound comes in time to reach and even bury some of the lower limbs. The material of these mounds is the mud from the bottom of ponds and canals.

Olive Culture.—From the same volume, page 586, Consul Wingate writes:

The true olive is not raised here; what is known as the Chinese olive belongs to an entirely different family. This olive is extensively cultivated, usually on the foot of the hills. The trees are grafted and enriched with liquid manure after the fruit is gathered. It is a fruit that is only appreciated by the Chinese. A peculiarity in its cultivation has impressed me as novel and contrary to our ideas of what would prove beneficial. The young olive trees are planted out in hot weather, and instead of dipping the roots in water, or protecting them from drying, a small fire of straw is lighted, and the roots are held in the flame. The operation, as witnessed by me, seemed much like that of a cook singeing a chicken. The only reason for this, that one of whom inquiry was made could give, was that the trees are hard to make live when transplanted, and that this warming helps in the matter of their living and thriving.

The questions of greater importance to be considered at this Convention are first, *insect pests*; second, *distribution*, and *drying* as accessory to the distribution. In a few years more we will have ten times as much fruit as now, and it is necessary that we combine to increase the demand; as a very important part of the marketing, I would encourage the further investigation and application of cold storage; with this aid our marketing period can be more than doubled.

Insect Pests.—The *Icerya purchasii*, or fluted scale, has assumed very alarming proportions in the vicinity of Santa Barbara. There is nothing practically being done to eradicate this pest beyond the city limits. Our community does not comprehend the danger that awaits them. Some radical measure should be adopted to arrest the spread of this insect. I trust there will be some report made of the experiments with chemical gas in Los Angeles County. I do not wish to be considered an alarmist, but I beg to call your attention to what has been done in New Zealand regarding the rabbit pest. I quote from Consul Campbell, of Auckland, volume 88, page 150:

The rabbit pest is the greatest evil that has afflicted the Australasian colonies, and perhaps no greater evil has ever come upon any country. To eradicate it from New Zealand has been the constant aim of the government and people, and the ways and means devised and put in operation to this end, have been numerous and ingenious. A Rabbit Department has been established in the government, with a superintendent in charge, local boards have been created, and private enterprises set on foot, all having one common object in view—the extermination of the rabbits. The sheep farmers of New Zealand were principally from England, and were fond of the ways of the old country, and it is said that rabbits were introduced for the chase—a popular amusement of the Old World. But it is of little consequence now, as to why or how the rabbits were introduced; it is certain that they came. They were brought from England, Scotland, and from Tasmania, and were turned loose upon the country. There were several kinds, the silver gray, the silver brown, and now and then would be found the black and white furred, but all belonged to the great rabbit family, and were destined to be seen and felt in New Zealand. When it is considered that rabbits breed from six to twelve times a year, the enormous increase that came from the rabbits first introduced is not surprising. It is certain that nothing could so overrun a country since the locusts of Egypt. It is difficult to estimate the great damage done to this young colony by rabbits. They have eaten out the ranges, so that the capacity for maintaining sheep has greatly lessened. The loss has been immense, running up into millions. At the Australasian Stock Conference, held in Sydney in October, 1886, it was shown that the carrying capacity of the land had been reduced a third, and the weight of the fleeces had decreased from one pound to one pound and a half each fleece. The lambing percentage had decreased from 30 to 40 per cent, while the death rate increased from 3, 4, 5, and 6 to 10, 11, 12, and 13 per cent. In 1882, what is known as the "Rabbit Act" became a law. Since then the government has expended annually \$35,000 on the government lands alone, and that it was estimated that \$1,256,000 was expended annually by private individuals. During the last eight years there has been expended the sum of \$12,000,000, and a very much larger sum from the beginning of the warfare.

We have quite frequently of late read accounts of rabbit drives in the San Joaquin, which have been attended with considerable sport, people going from long distances to enjoy the fun.

It is not my desire, nor do I wish to be understood as underestimating the rabbit plague in New Zealand or in the San Joaquin, but I do not hesitate to predict that the *leerya* in California, unless soon arrested, will be worse than the rabbit plague in New Zealand. You cannot drive it, there is no sport or fun connected with fighting it, but on the contrary, every one going into badly infected districts will turn away with disgust.

In the last report of Professor Riley on this insect, in Bulletin No. 15, page 32, there is an article by E. J. Dunn, published in Melbourne "Argus," August, 1886, as follows:

I desire to call attention to a species of *Coccus* known as *Dorthisia*. This destructive pest was first observed on the island of Bourbon. Thence it spread to Mauritius, about twenty-five years since. In Mauritius it destroyed the orange and lemon trees, many of the ornamental shrubs and acacias, and wrecked most of the beautiful plantations and shrubberies.

At Port Luis it still exists in loathsome masses on the handsome talipot palms. About twelve years ago it was noticed for the first time in the Botanical Gardens, Cape Town, and most probably arrived there from Mauritius with plants sent to the Botanical Gardens. During the first summer it spread about three miles into the suburbs, along the railway. Its fearfully destructive character now became evident, for the orange trees, the Australian wattles, the pettosphorums, and the blackwoods, became loaded with this disgusting parasite, and the trees slowly but surely succumbed to its attacks.

All trees of the orange kind, such as lemon, citron, shaddock, etc., proved especially suitable food for the *Dorthisia*, and once a tree became infested no amount of syringing or washing prevented its destruction.

The disastrous results of its arrival at the Cape are all too evident. Formerly in Cape Town itself, and throughout the suburbs, the orange tree lent a charm to the gardens that no other tree could give, and in the Western Province orange growing formed a most important source of wealth, many farmers netting several hundreds a year from their orange groves. Some of these groves, planted by the Huguenots and their descendants, were of great age, and besides being profitable, were objects of great beauty. Those of the Pearl, French Hock, and Wagenmakers Valley, were especially famous.

To-day this is all changed, and except for a few dead stumps, these fragrant groves, and this valuable asset in the country's wealth, have disappeared. Not so the *Dorthisia*; it is still advancing steadily, and leaving destruction in its wake, and will continue to do so as long as suitable food is within reach.

Now, my fellow-citizens, will you adopt some radical measure to arrest the ravages of this pest, or remain inactive; and, sooner or later, resort to the measures adopted by the people of Cape Town—fire and devastation?

The *Coccus olea* or *Lecanium olea*, commonly known as the black scale. No new development since report made at the Santa Rosa Convention. The rainstorms this winter made it impossible to get on the ground during the months of January and February. No other insects, excepting the above, have made their appearance to create alarm, so far as I have heard.

Fruit Unions.—There is no branch of the business that requires such united efforts as the distribution. Without fruit unions we cannot make a financial success. We cannot grow too much fruit, if it is properly distributed. The shipping of ripe fruit must not be in over quantities to any one market, but in such quantities as will be eagerly taken up for immediate consumption. Every market that will take one carload must be sought out. Trainloads can be divided at the Missouri River, and from there go to the place of destination by the most direct trunk line. It cannot be managed with success if each individual fruit grower undertakes to ship his own fruit. It must be from a central office, where a careful record is kept of fruit demands in every market, and shipments directed from that office. The quicker fruit growers realize this fact the better. Trees are planted every year by the million. The fruit product will be enormous, and if we do not have the knowledge of distribution perfected, serious losses must result. The drying can be carried on with the ripe fruit shipping; in fact, this is the safety valve of the whole business. Ship all the ripe fruit the market will bear, dry the rest. The central office ought also to manage the dried fruit. There is no reason why any market should be overstocked with dried fruit. A suitable warehouse can be obtained, where advances can be made on dried fruits, and thus relieve the necessity of forcing sales. Our knowledge as to growing fruits is well advanced, we are, to a certain extent, well informed, drying and canning the same. The kinds, and varieties, and localities the same. The manner of packing has almost reached perfection, so that we are now in the advanced stage of discussion on these points.

The sulphuring, in the process of curing or drying fruit, was denounced in quite an animated discussion at the Santa Rosa Convention. It was claimed by some that there was danger of poison, from others objections were made from a moral standpoint. The remarks, however, were mostly made from statements that were without foundation in experimental facts. I have taken some pains to investigate what does result from the fumes of sulphur. I give below the statement of an analytical chemist of Philadelphia, a warm personal friend, to whom I wrote for information:

Sulphur, when burned, combines with the oxygen of the air, forming sulphurous acid, a combination of one of sulphur with two of oxygen. It is a gas, and passes up among the fruit practically unchanged. Sulphurous acid is further oxidized by the action of air and moisture, forming sulphuric acid, a combination of one of sulphur and three of oxygen. This last process is, however, slow, unaided by stronger oxidizing agents. The quantity, therefore, formed in the process of fumigating would be very small and hardly appreciable, and what little would be formed would enter into combination with the fruit and not be in the free state. The effect of sulphurous acid on vegetable and animal matter is manifold. The changes that concern your present inquiry are as follows:

First—Bleaching, caused by the deoxidizing of the coloring matter contained in the fruit. In this action, the sulphurous acid combining with the oxygen of the coloring matter forms sulphuric acid, which combines with the vegetable matter of the fruit.

Second—Sulphurous acid has the quality of combining with nitrogenous organic compounds (albuminous bodies) contained in the fruit and preventing the decomposition of these easily decomposed bodies, thereby preserving the fruit in an unaltered condition. Sulphurous acid is therefore an antiseptic. Furthermore, the presence of a small quantity of sulphurous acid in the fruit aids in its preservation by preventing the action of par-

asites. In fine, the presence of sulphurous acid destroys spores and prevents the formation of fungi, thereby checking putrefaction and fermentation. The process of putrefaction is a complicated one; it may be considered as a slow combustion, commencing when fungi forms on the surface with sufficient access of air. The fungi appears to transfer the oxygen of the air to the body; oxidation takes place, converting the elements of the body into carbonic acid, water, and ammonia. By alcoholic fermentation the sugar of the fruit is split up into carbonic acid and alcohol. I have examined some dried fruit from California, with the view of determining whether any free sulphuric acid was contained in the fruit. The result of my examination proved the entire absence of free sulphuric acid. There was a fraction of one per cent of sulphuric acid in combination with the fruit amounting to only .05 per cent. I am of the opinion that the fumigating process, instead of being injurious to, or leaving any poisonous substance in, the fruit, is, on the contrary, beneficial, improving the quality of the fruit by preventing the formation of substances more or less injurious to health.

It is evident to my mind that sulphuring English walnuts, unless done with great care, will injure them. The two lobes in more than half the nuts are not so close but that the fumes enter and seem to unite with the oil of the kernel, so that this contact will cause them to become rancid in a few months. With the almond there does not appear to be any danger.

Freight Rates on Fruit.—The Chamber of Commerce appointed a committee to act in conjunction with a committee appointed by the California Fruit Union, to obtain the best possible rates from the railroad companies. The fruit growers at the Santa Rosa Convention also appointed a committee to act with the above committees. Our committee was composed of James Bettner,* George F. Hooper, and S. J. Stabler. I recommend their continuance.

What to Plant, and What to Grow.—I refer to an essay of Felix Gillet, dated Nevada City, December 11, 1887, published in the "Rural Press and Pacific Fruit Grower."

Protection of the Fruit Industry.—The Mills Bill now before Congress puts on the free list oranges, almonds, and walnuts, and reduces the duty on raisins and prunes. I recommend that this Convention respectfully protest against any changes in the present tariff duties, so far as it affects the fruit produced in California. The duty on almonds is 5 cents per pound, walnuts 3 cents, oranges \$1 60 per one thousand. As I am a large grower of almonds and walnuts, I seriously object to any reduction in the duty. The average net price that I have received for the past five years is, for almonds, 10.9 cents per pound; for walnuts, 8.10. Presuming there should be a decline equal to the duty, I should at once root out my almond trees, because there could be no profit at these reduced prices. Was it even probable that by the reduction of 5 cents a pound that our people who purchase the nuts would continue to save this amount on what they purchased, there would be some reason for the reduction; but on examination, I learn from my former agent in San Francisco, who was in the shipping business, and who received consignments of these goods, that the lowest price he ever received for almonds was 22 cents. During the first years of the California production the uniform price was 25 cents. As soon, however, as more was produced than our home market would take, a rapid decline to less than one half said price took place. They have been sold as low as 11 cents. Remove the duty, and European producers would drive us out of the business, and then put up the price to former figures; so that reducing the duty means bankruptcy to the producers, and higher prices to the consumers. I have taken some pains to investigate the value of labor, or the prices paid for labor, in countries where we have competitors, or may have competitors:

* Deceased soon after.

West India Islands.—Barbadoes, Consul Reed, in volume 86, page 248, gives the price of 20 cents per day for men, and 15 cents for women. Antigua, Consul Jackson, in volume 69, page 160; men, 20 to 24 cents; women, much less. Guadalupe, Consul Bartlett, in same volume, page 163; men, 22 cents; women, 18¢. Cuba, Consul Pierce, volume 65, page 267; men slaves, \$3 per month; free men, \$4 25. On the western end of Saint Domingo, where I lived and did business for a period of ten years, and was for a time joint owner of a sugar plantation, we paid men 16 cents; women, 12 to 14, and they boarded themselves.

Italy.—Consul Touhay, volume 69, page 123; men, 120 francs per year, equal to \$22 50, with some perquisites which are estimated by the same Consul, page 124, to be worth from 40 to 60 francs a year, or about \$3, making but little over \$25 for a year's work.

Near Rome, Consul Alden, volume 76, page 120; 20 to 40 cents, not including board.

Catalonia.—Consul Scheuch, volume 70, page 243; 40 cents per day.

Marseilles.—Consul Mason, volume 70, page 215; \$5 to \$9 per month; \$7 would be a fair average.

Morocco.—Consul Mathews, volume 69, page 184; 5 to 20 cents per day.

Hawaiian Islands.—Consul Putnam, volume 69, page 140; men, \$9 per month; women, \$6.

I might pursue this investigation to much greater length, but do not consider it important to do so. I will, however, state that about the same rates exist on the west coast of South America, and less rates from Mexico to the Isthmus of Darien, or Panama. One other fact, however, I wish to state, although not pertinent to the fruit industry of California. Consul Mason, of Dresden, in the volume entitled "Labor in Europe," page 16, writes:

An important factor in the labor of Germany is not inquired of in the circular, viz.: the labor of dogs. I have heard it estimated that women and dogs harnessed together do more hauling than the railroads and all other modes of conveyance of goods united. Hundreds of small wagons can be seen every day on all the roads leading to and from Dresden, each having a dog for the "near horse" harnessed, while the "off horse" is a woman, with her left hand grasping the wagon tongue to give it direction, and the right hand passed through a loop in the rope, which is attached to the axle, binding her shoulder; thus harnessed, woman and dog trudge along together, pulling miraculous loads in all sorts of weather.

I mention this merely to show the difference between our American system and the system of some other countries. We quite frequently hear of syndicates being formed to purchase large landed districts in Mexico for the purpose of orange growing. Not at \$1,000, \$1,200, to \$1,500 per acre, as at Riverside; or at \$1,000 per acre, in the San Gabriel Valley; or at \$500 per acre in Goleta, this county; but \$1 or less, with the most favored spots at less than \$10 per acre. There is not only this difference in the cost of land and the price of labor, but the command that those governments have over the laborers. Consul Herring, of Honduras, Central America, volume 82, page 288, writes:

A strike was attempted once; the strikers were hunted and arrested by soldiers or policemen, under orders from the government authorities, given a sound flogging, and sent back to their work.

Rather a summary way to solve the "great problem," yet it worked like a charm.

As to the condition of wage workers in this country, I repeat from my opening address at Santa Rosa: "That in twenty years agricultural implements have displaced 50 per cent of muscular labor, the productive area more than doubled, and that notwithstanding this displacement of manual labor, wages have increased 60 per cent. That the necessities of life, as well as the luxuries of civilization, are at the lowest prices in our history."

A few words more and I will close. It is now about seven years since the creation of the State Board of Horticulture. I had the honor of being a member of the first Board, and was present at the first meeting. When I look back to that period, knowing the crude state from which we developed, the difficulties we had to encounter, and our own inexperience during the first years of our organization, it is with feelings of pride that I appear

before you to-day. At that time fruit growers were groping in the dark, their operations were mere experiments, the results uncertain. To-day there is no uncertainty amongst the intelligent fruit growers, many branches of the industry are now a science well mastered. I venture the assertion that nowhere in the world is the business so generally and so well understood as in California. The dissemination of important knowledge, the progress made, has reached the most isolated fruit gardens, as well as the most princely orchards. Fruit growers vie with each other to discover new facts, and to disseminate them; we are united, our mutual efforts have secured for us in the past year a success beyond our most sanguine expectations. I do not claim this credit on the part of the Board; all interested fruit growers have contributed; it is the result of our united efforts.

The Board has been subjected to the most stinging criticisms, and, very possibly, deservedly so. But what other organization, State or otherwise, can show better results? We have given our time and our money almost without compensation. I have served for seven years to the best of my ability, devoting much of my time, with considerable money, and think that I should be relieved and some other put in my place.

Ladies and gentlemen, members of this Convention, all these questions are submitted to your consideration.

ADDRESS OF WELCOME.

HON. RUSSELL HEATH, of Carpenteria, was introduced by the President, and delivered the address of welcome, as follows:

Ladies and Gentlemen: In considering agriculture and horticulture in Santa Barbara, it will be necessary to speak of the early efforts of that devoted body of men, who came to the coast under the auspices of the Catholic Church, particularly protected and encouraged by the King of Spain, who then claimed this vast territory. As a body of missionaries they came to civilize the Indian tribes; but their great distance from their own country rendered it necessary for their own support, and the support of their converts, that the land should be cultivated. Not content with the ordinary cereals for bread and food, the habits and tastes acquired in their own favored Spain induced them to try the choicest of the fruits of their own and neighboring countries; to these wants, necessities, and desires, we are indebted for the introduction of the pomegranate, fig, date, apple, pear, grape, orange, lemon, lime, olive, and the nut-bearing trees of the Mission gardens. Here it was that wheat was cultivated and manufactured into flour for the use of the different parts of the coast. From the propagating gardens established here were distributed the trees, vines, and shrubs, to other mission establishments; here the sheep were cared for, whose fleeces were manufactured into clothing and blankets for the priests, converts, and soldiers, stationed for their protection. When we consider that this occurred one hundred years ago, agriculture and horticulture can hardly be said to be in their infancy; and when we consider that at one time this Mission had under its care and instruction three thousand Indians, we must conclude that their operations must have been conducted systematically, and on a grand scale. Everything had to be produced, houses built, animals raised and subjected to toil, implements of every description manufactured. Am I saying too much, then, when I say we are greatly indebted

to those missionary priests for their experiments in this new and untried land?

These things, great though they were, were destined to have an end. Revolution, the destroyer of civilization, came. The Spanish of the Americas declared their independence from Spain. The missions were despoiled of their hard earnings, and left without means of supporting themselves or the Indians. All sank into poverty together. Thus things continued, until fortune finally placed our own republic in possession of our Golden State. Some time was spent in mining for the precious metals; but the ever restless Americans soon learned that in the soil was to be found what in reality would make California one of the brightest of the American constellation. Under this new order of things, Santa Barbara's first Agricultural and Horticultural Society was formed in 1856, with a membership, if my memory serves me right, of about twenty-five, and James Ord, now stationed in Arizona, as its first President. But few of the old members still remain. From that year dates this new era in agriculture. Orchards and vineyards commenced to be planted. The thread dropped by the mission fathers was taken up by the American settler. All of the choice fruits of our own country have been experimented with. Europe, Asia, Africa, and the islands of the sea, have been called upon to increase our store. You will be able to judge with what success this work has been prosecuted when you examine the exhibition of the society. Remember, this is not the time of year when we have our fruits fresh, and in perfection. Such as we have, we welcome you to. In the name of the Horticultural Society, I welcome you to our society, city, and county. We claim no superiority over our neighbors of other counties. We are striving to keep pace with others. The laggard has no place with us. We indulge the hope that you may see enough in our county to please and interest you, and when you shall have returned to your distant homes, that some slight recollection may remain of your brethren in horticulture in Santa Barbara County. Again, I welcome you.

VICE-PRESIDENTS.

THE PRESIDENT then announced the next order of business to be the election of two Vice-Presidents, and an Assistant Secretary.

On motion, Mr. H. C. Ford, and Mr. Edward Ivison, of Santa Barbara, were elected Vice-Presidents by acclamation, and Mr. A. E. Putnam, of Santa Barbara, Assistant Secretary.

THE CULTURE OF THE SOFT-SHELL WALNUT.

Essay by JOSEPH SEXTON, Goleta.

The culture of the soft-shell walnut as practiced by me is the same as for the common nut and all stone fruits. The seed should be planted in beds during the month of January, and covered about one inch deep, and kept moist, but not wet, until they germinate, which will be in about three or four weeks, according to the temperature at that time.

As soon as they crack and show the sprout, they should be transplanted to the nursery rows, four and one half to five feet apart, and six inches apart in the row. They will grow the first year without irrigation six to twelve inches, and with irrigation six inches to four feet; the second year from four to eight feet without irrigation, and about the same with it. I

cultivate all without irrigation, and think they make a better tree to plant where irrigation is not to be practiced.

The best aged tree to plant is two years old; not that I think the age makes any difference, but the trees at that age are of a size that they can be seen, and no danger of getting damaged while cultivating. In careful hands, I believe one-year old trees as good or better; and, perhaps, it would be better still to plant the seed where you want the orchard tree to grow; but if planted in this way, great care must be taken for two years in cultivating, that they do not get trodden down and the tops broken off, which makes the orchard uneven and unsightly.

When planting two-year old or large trees they should be selected, planting the largest trees first, and keep on doing so until the orchard is finished. By doing so you can get trees of equal size together.

Some say it will not do to plant the seed where you want the tree to grow; that it must be transplanted, and the tap-root cut to make it fruit. I have tested this claim and found it a fallacy, and find nuts planted alongside of one-year old trees all have proved prolific, and are larger trees than those one year older. If this theory were true, I think the gopher would attend to the root pruning generally, and we should feel thankful that the gopher, or some other rodent, struck the tap-root of the first walnut tree.

The soft-shell walnut should be planted in orchard form, forty by forty feet. It is more upright in its growth than the common walnut, and will do as well forty by forty feet as the hard-shell will fifty by fifty feet.

Low-growing crops can be cultivated for several years in the walnut orchard, until they commence to fruit. Beans and squashes are preferable to potatoes or root crops, as those attract the gopher, who is very fond of the walnut roots.

The soft-shell walnut commences to fruit at six years old from the seed, and some have been known to fruit as young as the fourth year. My trees have produced full crops each year for the past fourteen years. The hard-shell commences to fruit about the ninth year, and bears full crops alternate years. The soft-shell is not as strong a grower as the other walnut; it being so prolific retards its growth, and at the same age—taking a number of years together—it will not produce as much fruit per tree as the hard-shell variety, and at the same price it would not be as valuable a tree to plant. But the trees can be planted closer together, and the price can be made so much more that it will be the most valuable tree to plant.

The price is greater at this time, and when there are enough produced to compete in the market, there will be as much difference in price as there is in the hard and soft-shell almond to-day. I have sold the most of my soft-shell walnuts each year for seed, and have offered but few in the market, and where I have the price has been 13 cents. The hard-shell has ranged during the last ten years from 7 to 10 cents. If we had as many Santa Barbara soft-shell walnuts to put on the market as we have of the other varieties, I think the price would be nearly double and quicker sale. It is a superior nut, and when better known will be pronounced so by all. The kernel is white, and better for confection and for all other purposes. The shell is thin, rendering them easily broken by the hand, at the same time strong enough to bear transportation to any part of the United States.

The origin of this nut may be of interest to this Convention, and it is as follows: The winter of 1867 I bought in San Francisco a large sack of what they called English walnuts. I cannot say whether they were mixed or not. I had but little experience with the walnut previous to this. I raised about one thousand trees that season, and planted two hundred of them the following spring, in orchard form, at Goleta. Sixty of them proved to

be the soft-shell variety. The balance I sold at one, two, and three years of age; part of those proved also soft-shell. This walnut, like all others, should be planted in deep, rich, sandy soil to insure the best results. The soft-shell is a little later starting in the spring than the common nut, and blooms about ten days later; and I have expected it would come true from seed, but I find they sport some; yet, at the same time, I have found none that deteriorate, and all that have come different I believe to be an improvement. I exhibit some of both varieties for the inspection of this Convention.

I planted twenty-four trees raised from soft-shell nuts; twenty-one came true to parent tree, and three made a much stronger growth, and commenced fruiting at the age of six years, same as soft-shell, and produced the improved nuts. I have not had time yet to test their bearing qualities, they having fruited but two years. If they should bear full crops each year, as the soft-shell does, and the tree a more rapid grower, even if the fruit does not prove superior, they will be considered an improvement.

The walnut wants but little pruning, and I cut none but those limbs that run down and are in the way of teams while cultivating. I prop thoroughly while the trees are heavily laden with fruit and foliage, and they should be kept up to avoid cutting. If limbs have to be cut off on the upper side where water is liable to collect, they should be waxed, as the walnut limb is generally hollow, and water enough may collect to rot the limb.

The soft-shell ripens a little earlier than the common nut, and they both vary somewhat according to the season. We generally commence to pick on the tenth to the fifteenth of September, and gathering lasts a month to six weeks. There are different modes of gathering; some clean the trees at once, and others go over them several times. I pick what has fallen without knocking. I then tap those limbs lightly on which the nuts are ripest, and the third time over I aim to clean the trees. The walnuts are picked up and put in sacks and barrels, so as to be easily handled and hauled to a sunny place to dry, and should be placed on elevated platforms made of narrow boards, with spaces of one fourth of an inch between each board. The platform should be about eight feet wide and forty feet long, or as long as two men can handle a canvas to cover the beds, which should be done every night the dew falls.

The nuts should be stirred in these beds once or twice each day, and with favorable weather they will dry sufficiently in three days, and are ready for market. I have always dried my walnuts by the sun, and they have given good satisfaction, and for small orchards, I think it is the cheapest and best way. Some dry by evaporation, and claim it is preferable to the sun; that it sets the oil quick, and prevents the nut from becoming rancid. Others claim that it makes them so; but be this as it may, those having large orchards cannot depend on drying all by natural heat, and the drier will have to be used, even if it is not so good for the fruit.

The walnut is marketed in sacks, the greater portion in what is called walnut sacks, and holds about one hundred and twenty pounds; others use the common barley sack, holding sixty-five pounds.

THE HARD-SHELL WALNUT.

Remarks by MR. RUSSELL HEATH:

Mr. President, there is a great diversion of opinion among walnut growers, with regard to the culture of the walnut. I believe I am the first man in this county, outside of the mission priests, who attempted the culture of the English walnut; I commenced it in 1858. I listened, with a great deal of attention, to the essay of Mr. Sexton, to find the history of the soft-shell walnut. In 1858, there being no trees in California of the walnut species to be obtained, I procured of Mr. Wolfskill, in Los Angeles, the nuts to plant the first nursery in this county. There was no such thing known in California then as the soft-shell walnut. Of the thousands of trees that I produced in my nursery, I raised one tree only that differed from the original stock—walnuts having always been understood to be true to its stock. Those trees were planted in the fall of 1858, consequently the trees were started in the winter of 1858-9. When Mr. Stowe came here, in the spring of 1873, he applied to me for walnuts to plant in nursery, as he could not obtain sufficient trees to plant the ground that he was desirous of planting. I furnished Mr. Stowe with a large quantity of nuts. I had the previous year placed walnuts in the San Francisco market, and very likely it was from that lot of nuts that Mr. Sexton obtained his first soft-shell walnuts, because the first soft-shell walnut was produced from a nut from the Wolfskill orchard in 1859, in my orchard, and I was not aware of the existence of that soft-shell nut, until my attention was called to the fact by Mr. Stowe of these trees in the nursery, produced by himself from seed obtained from my farm, that there was one tree different from the other trees, and he desired to know how it was, that there was so much difference in walnuts, where the seed all came from the same farm. At that time I was not aware of the existence of a bearing soft-shell tree in my orchard, and wrote Mr. Stowe that at my first convenience I would go out to his orchard and examine those trees. I did so, and found, to my surprise, the soft-shell walnut, a walnut that I was not familiar with, that I never had noticed in my own orchard at all. We watched that tree, and that same fall, in gathering the fruit in my own orchard, my superintendent called my attention to the existence of a tree, which he said was different from all the others, and wanted to know if he was to put that fruit with the other fruit. I said, no; don't put it in if it is different, as I wanted to examine it, and went down there and saw by the leaf that Stowe's was a soft-shell walnut, and that the soft-shell walnut undoubtedly came from the seed that I had sold to Mr. Stowe.

Now, my belief is, that the soft-shell walnut was a chance fruit obtained from the seed from the Wolfskill orchard in Los Angeles; because, before that time, there was no such fruit. So much for the soft-shell walnut. It may, or may not be true, that the seed obtained by Mr. Sexton from San Francisco may have been from that which I had in San Francisco for sale, as I had seed in San Francisco for several years for sale, and being one of the first experimenters in walnuts, I had no trouble in selling the fruit.

With regard to the planting of the English walnut, it is a question that I approach with a good deal of delicacy, especially as I am led to differ from our President, a gentleman whom I esteem as high as any man in the State, as to the poisoning of walnuts. My place of two hundred acres was one mass of oaks, and there is not one single acre of the one hundred and eighty acres now in walnuts, but what had oaks that would cut from four to fifteen cords of stove wood; and yet I never lost a tree planted among

the oaks. Now, whether it is poisonous in the soil occupied by Mr. Cooper's orchard, and not in the Carpenteria, is a question that only the analyzation of the soil can prove, but in my locality the oak is not poisonous to the young walnut. The great mistake, in my opinion, in the raising of the walnut is that a suitable locality is not first obtained. I saw, as early as 1854, that California was destined to be what she is only now realizing, one of the richest States of the Union, and that in the soil was the secret of her success to be. Realizing that, and being ignorant of farming—for I never had held a plow in my life, never had lived outside of large cities—I looked from San Luis Obispo to San Diego, seeking for lands where I might plant the walnut, the almond, and the grape. I first went to Ventura County, and, after a year and a half, found that I had made a mistake in my selection; and, looking around other localities, I found in the Carpenteria a dense jungle, such as could not be found outside of Santa Barbara County, and said to myself, "If this will grow this jungle it will grow the walnut, the almond, and it must grow the grape," and I cleared that land at an expense of from one to one hundred and fifty dollars per acre, and I planted the orchard that I now have. With regard to the soft-shell walnut and its profit and the hard-shell walnut, so called, I claim that no living being can tell the difference by the kernel of the two nuts. A few years ago there was a company of eastern people visiting our city, looking around. A good deal of talk had already been created with regard to the soft-shell walnuts. As I was getting fancy prices, I didn't object. I got as high as 50 cents a pound from nurserymen who were making a big thing out of the soft-shell walnuts. I put out a nursery and planted four hundred trees, and I have got all the soft-shell walnuts I want, and when one dies I don't want another; and my objection is this, that they are too difficult to ship, too difficult to handle, too difficult to market. I say that no man can tell the difference of the quality. I was firmly of that belief, and I am firmly of that belief to-day. There were ladies and gentlemen present at my table, partaking of a dinner, and there were hard-shells and soft-shells in the same dish, because I made no difference in selection. They said, "Yes, these are very nice walnuts, but I always prefer the soft-shell; they are much higher flavored, a much better nut." "Well," I said, "that is simply a difference of opinion, some might think the common walnut equally as good," and while conversing I used my nut-crackers, because I didn't want them to see that I could crack my nuts with my fingers, which I could do with all the nuts on the table, and I cracked the soft-shells and the hard-shells, and placed the two in dishes by themselves and passed them around to the ladies and gentlemen present, and asked them to kindly tell me which was the hard and which the soft-shell, which is the higher flavored of the two. The test was made, and two ladies announced that they had made the discovery; they declared that no such nuts could ever be raised on a hard-shell tree. I had the shells and kept one. My wife was looking at it. She thought I was going to try the soft-shell walnuts, because I contended that there was no difference. I said, "Which do you call the best nut?" They said, "Why this; there is no mistake about it; there can't be any mistake." And, lo, and behold! they had selected the hard-shell walnut. And that is the difference, simply fancy.

Now, in the distance of planting the soft-shell walnut, and I must refer a little to Mr. Sexton's essay with regard to transplanting trees. I don't know much about this thing, but I have experimented, and that is the only way I had to learn. I didn't know anything about horticulture, I had everything to learn from books and experiments, and all the knowledge I have was by books and by experiments. I commenced trans-

planting trees in my nursery at one year old; each year I renewed my nursery rows, planting each year so as to enable me to have trees for my own land, which I was obliged to clear in order to prepare it for the orchard. I planted after the first year, I planted after the second year, and continued that planting year by year from three different nurseries of different ages; when I arrived at the ninth year of the planting, my trees had then been in bearing one year in the nursery, and now this is the result as my experiment goes. The trees that I planted out one year will bear its fruit the seventh year. Now, with regard to the bearing of the walnut in four and six years, and seven years, let me say this right here, that in its native country Persia, it bears at eight years, and never was known to bear in less than eight years. I know that California is excellent; I know that it excels in many respects, but I say Persia is good enough for me; eight years for the walnuts is as soon as I ever had them in my orchard from the seed. I planted the one-year old tree, the two-year old tree; I lost the two-year in nursery, because I say that my experiments prove that two years is an unnatural time to transplant the walnut. I will tell you why. The first year the walnut makes from three to seven inches, and I should advise any man who desires to set out any orchard, especially on the coast, to buy no irrigated trees, because irrigation is not necessary here. The second year the tendency of the walnut is this, and there are two periods that the walnut ought not to be transplanted, that is the second, and after the fifth year; the root starts the second year and makes a partial growth, and then it divides itself between top and root.

I will ask any walnut grower that has watched his nursery, if that is not correct? The walnut will start and grow in root first without starting at the top until it has made a certain period of growth and then the root grows if not forced. Now, I want to emphasize that matter of forcing trees, because I can take a fig and make it grow ten feet from the cutting by forcing it; I can take a walnut and make it grow ten feet the second year, but I say that is an unnatural growth and it ought not to be indulged in. The second year I say, then, is dangerous; it is the period between the top and the root, and when you take it up you destroy that growth; the third year, it makes top alone, comparatively no root; it is then that your little tree, twelve inches high, grows up to the height of six to twelve feet. It is the top that is making that year, and, of course, you do not desire to transplant a tree that is all to top and not to root, because when you take it from the nursery rows, you must allow that tree to go down and make the root first, before it can make the top. After the third year you can transplant it with safety. Why? It has made its top; the fourth year its tendency is to root and not to top, because on the fourth year it makes its spurs two inches on the side of that growth of the third year. The tendency of that year is all root, and if you want to transplant a young tree, then take up your three-year old tree and transplant it, and you will get your fruit then as quickly as the age of the tree will allow it to bear. After the fifth year the tendency then is not to make root; then is the time when those little branches, two inches long, send out the long arms to the distance of seven or eight feet; then it is that you want more care in your orchard than at any other time; then it is that your tender shoots, especially in exposed conditions, are liable to be cut upon the end by the frost; then it is, if you are in the interior, that one hot blast will kill the ends of your tree because it will have vigorous growth growing after the fifth year, and about the sixth, and the only remedy is then the knife, which any orchardist can tell when and where to apply, because, when the tree is touched by either cold or heat, you will see it by a little mark of black,

and then use the knife below that black mark. I have never lost a walnut when I took that means of preservation. Transplanting trees, my experience is, that I never have had a nut from my trees that I transplanted from one year old to seven, without waiting six years. Mr. Sexton has raised them in four years; I do not dispute his word, I only state my experience, that I never have produced a walnut in less than eight years, except as I am about to tell you—in my experiments, remember that I made them from three nurseries, growing at three different periods of time—I transplanted my trees after they had passed the age of bearing in my nursery rows; of course, nurserymen can not afford to raise trees of that description, but a man who stakes his money and his time upon an orchard, can afford to wait. It takes time, and requires money, but no man can succeed raising a walnut without the expenditure of money and time.

I transplanted eight hundred eleven-year old trees, and did not lose one in transplanting, and last year I had fruit upon more than two thirds of those trees; two years ago I did not transplant, because the season was not favorable; this year I have transplanted six hundred trees more than twelve years old, and I will get fruit from those trees as sure as I am a living man—or perhaps my son will if I am not here—just as soon as that crop forms, because I cut the top entirely off at eight or nine feet from the ground, regardless of limbs. I cut the top square off, and some of my neighbors came and saw what I was doing. They said: "He is putting out hitching posts." I have a thousand out, and I would to God I had twenty thousand more, because those hitching posts are now bearing and putting money in my pocket; and so I say to-day, that I had rather give \$10 for a tree that is nine years old than to give one cent for a tree that is four years old. I say there is money in it, because it costs me no time to cultivate in the nursery. One man will go through a nursery and cultivate a thousand trees in half a day; and if you place those trees in the orchard you are at great expense. Teams and men cost money. You can buy teams, and you can hire men; but I tell you that, even in California, with all its fruitfulness, you can't buy brains to drive those teams; that is our greatest curse; you can't buy brains; that is the trouble of every single orchardist who does not do his own work.

With regard to the profit of the English walnut—you need have no fear. Plant your walnut. You have an investment safer than anything in these United States. There is nothing that yields so certain as the English walnut; there is no odd year; there is no off year; you can hold your price better, and the money will flow year by year, as every orchardist that has his orchard in a good place will tell you, if he tells you honestly.

MR. COOPER: I would like to know about the expense of transplanting a walnut tree, ten years old, from the nursery.

MR. HEATH: My plan in transplanting the ten-year old walnut tree is this: All the trees I have in my orchard I have raised myself, or under my direction. I place my men, when the season comes, in trenching on each side of a row, and dig down at least four feet, leaving the lateral roots at least two feet and a half on each side; mind you, the walnut tree is a tap-root tree, and only by cultivation, or lack of cultivation, may you force it to send out lateral roots. The principal root is the tap-root, and now I desire to say something with regard to the cutting of the tap-root. When the trees are ditched in that way early in the fall, in December, with a prospect of a fair year, for I never ditch a walnut until I have some pretty good assurance that we are going to have a pretty fair year, because the walnut requires a very rich, deep soil, and must be wet—we don't

irrigate here, and we must get our rain from the heavens—then as I take up fifty trees at a time, I place my gang of men, may it be five, or ten, or fifteen, to digging holes, each tree, as it is taken up, never over twenty-five at one time, exposing the root. The wagon takes them in the field, the ground having been staked off carefully forty feet apart each way; the tree is laid down, the man digs a hole for the tree, measuring the roots; after the holes are dug I take, usually, two men to hold the tree, two men to fill, packing the dirt carefully around the roots—one man, generally my son, on one side, and another man that can do it carefully, lining them to keep them directly straight, as I desire my orchard to be perfectly straight; so it takes six men to transplant one tree. The expense of transplanting trees in that way is, of course, very much greater than transplanting small trees. Where the tap-root is cut off ten inches below the ground you simply take a spade and dig a hole, and a man goes and stamps up the ground to the tree—an unnatural, unreasonable way of transplanting any tree; no tree ought to be transplanted in that way. I think the expense of transplanting trees in the way I mentioned is about ten times what it would be for a three-year old tree.

Now, with regard to cutting the tap-root; I did not know anything about walnut culture; I was more indebted to these priests at the Mission than any knowledge I could get from books. I went to Sansavain & Wolfskill, who had been in the business for many years, but I tell you that the observation of the cultivators of the trees in Los Angeles was of very little use to me; they could not even tell me whether there were two blossoms on a walnut tree. When I found out that there must be two blossoms in order to bear its fruit, I wanted to know whether those two blossoms were on the same tree or on different trees. I went to Los Angeles, and propounded that question to Mr. Wolfskill and Mr. Sansavain (experienced men in the business); they said, "You are the most inquisitive man we ever heard of in our lives, never heard of such a thing here, I don't believe there is any blossom at all." I said, "Do all your trees bear, that is the question?" "Yes, they all bear." "Then, I say, they all have blossoms, and they all have two blossoms." I watched my trees when they came to bearing that year, and, lo and behold, I found the two blossoms which they had never noticed. Now, some wiseacre that thought he knew more of the cultivation of nuts than any other man in California, discovered in Los Angeles that if you cut the tap-root your tree would never bear, and that was published in the papers throughout the State. I said, "Here is a pretty kettle of fish again; I have cut all the tap-roots in my orchard, and I don't know whether I am going to have any fruit; I will see about this thing." They said that where the tap-root is cut, there the decay would commence, and an insect would attack the root and eat the life out of the walnut, and it would finally die. I determined not to be fooled much longer in spending more money, and took two men and went right down to my orchard. I could not make any mistake, because I had cut off every tap-root in the orchard. We dug down carefully by the side of the tree—I was going to be very careful about it—I had a very large magnifying glass, and took that with me, and after they got down below where the tap-root was cut, I got my magnifying glass and said, "Boys, you needn't use your shovels any more, I want to get at this thing with my hand," and took my glass and went down in the hole; I commenced digging like a gopher, and when I got down to where the root was cut, to my surprise there were two tap-roots, beautiful as could be, sent out from the place where the tap-root was cut. I examined five trees in that way, and each had two tap-roots, and I made up my mind that the Los Angeles men that had been writing about tap-roots were in a dream.

MR. O. N. CADWELL, of Carpenteria: I commenced cultivating English walnuts nineteen years ago. I have raised trees from the seed, and transplanted all the way from a year old up to six, perhaps, and they have grown and done well, but so far as my experience goes, I prefer to move them at three years of age, or about that time; the best trees I have were planted at three years old. A part of my orchard stands where they are not replanted, and I can see very little difference than where they were transplanted at two or three years old. I am a neighbor of Mr. Heath, and am conversant with his planting of his trees; they are growing nicely and looking well, but at times I have had a little anxiety as to what the result would be. It starts close around where he cuts it off, and it will take some time to heal there. I have noticed on several there is a dry place, and if that heals perfectly well, and the tree is sound, it is all right, but I have thought to myself sometimes, if he had the heavy winds to encounter that they do in some places, when those branches reach out like the branches of the trees when they were two or three years old, perhaps they might break at that spot; otherwise, I have no fear, because the trees grow nicely as far as I have seen.

MR. W. G. KLEE: So far, I believe the success of walnut growing has been confined to the southernmost counties, including Santa Barbara, Ventura, and Los Angeles. I think that there are other portions of this State where walnut culture could be made very profitable. There have been a number of trees planted all over the State; I have met with them in nearly every county in the interior. The experience has been that seedling trees, raised from Los Angeles walnuts, do not succeed; they have a great tendency to be injured both by frost and heat. They grow very late in the season, and are caught by frost, and during the summer the tender shoots are injured by the dry, hot winds. Now, experienced men have seen this; among others, one of the oldest horticulturists in the State, Mr. John Wolf-skill, on Putah Creek, some twenty-five years ago discovered that such was a fact, and he took and budded a few native black walnuts of the trees in his orchard, which had suffered with the common walnuts. These trees are now some twenty-five years old, and are as healthy, perfect looking trees as you can put an eye on; some of them are bearing well, others are not. I learned from him that those that do not bear were budded from trees that never had any nuts on, while those that do bear are from trees that show a tendency to bear. Seeing this, I have been urging upon nursery-men to propagate that stock, believing that the culture of the walnut could be extended very much. I know that a good many trying it have not made it a success, and that it is difficult to make buds take, but this season I saw in the Stockton nursery a number of young trees which have been budded successfully, and Mr. Clowes, the proprietor, told me that by doing the work very carefully, and taking out nearly all the wood from the bud, they had succeeded, and that it was considerable of a success, some 65 to 70 per cent of the buds had taken. I believe that it is in that way that walnut culture may be made to succeed where otherwise it would not. It certainly is worthy of further trial and experiment.

MR. LELONG: Two years ago I thought I would try to bud the walnut on to the wild California stock growing in the mountains, and went up east of Los Angeles, to what they call the Puente Ranch, and from there we drove out twelve miles into the mountains. There I inserted over five hundred buds into the wild California nut. I am told this year there are some over fifteen feet high, and only two years from the bud. The way it was done is this: The English walnut has a great many spurs on the small limbs. I waited until the stock had leaved out, when the sap flowed

freely. I cut the stock off, and took these spurs, cutting them as you do a bud, leaving to the bud a very large piece of wood; then that piece of wood was gouged out, leaving very little of the wood to hold the spur to the bud; it was inserted as a bud and waxed over. In about two or three weeks they began starting and made a very fine growth. Those that were budded with eye buds, as budding is commonly done, also did well, but not as well as those spurs, although I doubt whether it would be profitable on account of the squirrels—they take all the leaves off the buds.

MR. CROFTON, of Courtland: I have had very little experience in walnut culture, but some years ago I budded a black California walnut, and find that I made a success out of it. I merely inserted the buds in the usual way, as you would bud the peach or the plum tree. That was, I think, thirteen or fourteen years ago, and now it is a fine large tree and bears well every year. Mr. Lelong, when he was up there, noticed the tree, and everybody passing by is attracted by it, as it is budded some four feet from the ground, and below that the bark is black.

MR. LELONG: There had been some question in San Francisco about the propriety of budding the English walnut on this stock, and it was thought that by so doing it would make the walnut much darker and the shell much harder. I sent to Mr. Crofton for some specimens, which he kindly furnished, and I made a test of them and could see no difference either in flavor or color.

The Convention then adjourned until the following morning at nine o'clock.

SECOND DAY'S PROCEEDINGS..

SANTA BARBARA, April 10, 1888.

THE PRESIDENT announced the subject of the morning, "Insect Pests and their Extermination."

IMPROVED METHODS IN CHEMICAL FUMIGATION.

Essay by PROF. D. W. COQUILLETT, Los Angeles.

Mr. President, ladies and gentlemen: I have been requested to prepare a paper on the process of fumigating trees for the destruction of scale insects, and my apology for not producing a better one is, that its preparation was delayed until the last moment, with the hope that I might be able to give some definite facts in regard to the practicability of transmitting the gas from one tent to the other after the first tent had been allowed to remain upon the tree a sufficient length of time to prove fatal to the insects, but the necessary apparatus for making tests of this kind is not yet completed, so I am unable at present to give any facts in relation to the transmission of the gas.

The process of fumigating trees for the destruction of insects consists briefly in inclosing the tree in an air-tight tent, and afterwards filling the tent with a poisonous gas that will destroy the insects without at the same time injuring any part of the inclosed tree. The earliest account I possess of any attempt of this kind, is a copy of the specifications for a patent

granted to Mr. James Hatch, of Lynn, Massachusetts, on the fourteenth of May, 1867. Mr. Hatch's method consisted in inclosing the tree in an inverted sack, and filling the latter with the fumes of tobacco, pepper, and other noxious substances, by the aid of a furnace and connecting pipe; but this method does not appear to have been very widely adopted.

Dr. A. S. Packard, who for several years held the position of entomologist to the Massachusetts State Board of Agriculture, writes me that he is not aware that this method has ever been used in any of the New England States, and I can find no reference to its having been used in any part of the States east of the Rocky Mountains, from the date of the Hatch patent up to the present time.

It appears, therefore, that all the attempts at perfecting this method have been made in Southern California.

In the earlier experiments the tent used in inclosing the tree was constructed in the usual round or circular form, with a rounded or dome-shaped roof, and was lowered down over the tree from above; it was found, however, that the apparatus necessary for this work, when operating on tall trees, was altogether too awkward or cumbersome to come into general use; to obviate this difficulty, an opening or doorway was made in one side of the tent, extending from the roof to the ground, and when this doorway was opened wide, the tent could be put on the tree without being elevated very much; after the tent is on the tree the doorway is closed by bringing the opposite edges together and wrapping them one around the other, and to facilitate this a piece of gas pipe is fastened to the tent on each side of the doorway, and extending from the roof nearly to the bottom of the tent.

Mr. H. K. Snow, of Tustin, proposes using a tent of this kind, only having two doorways instead of one, so that after the tree has been fumigated sufficiently, the tent can be passed forward off the fumigated tree, and upon the one next to be treated. He proposes operating the tent by means of an apparatus consisting of four posts fastened together at their upper ends, from which the tent is to be suspended, while the lower ends of these posts are to be fastened to two runners, like those of a sled, so that the apparatus can be drawn forward astride of a row of trees. This is a very simple arrangement, and one that almost any fruit grower can construct with his own hands and at very little expense.

Mr. John P. Culver, of Los Angeles, a civil engineer, and a very practical man, has recently constructed a tent for inclosing the tree, which, for simplicity of construction and ease of operating, is a great improvement upon anything of the kind ever produced heretofore. It is in the form of two half tents, which inclose the tree from one side, and consists, briefly, of two inverted U-shaped arches, fastened at one side with hinges to an upright mast mounted upon runners. The tent proper is in four sections, and is stretched upon these arches, so that when the tree is inclosed the sides of the tent will rest upon the ends of the branches. The inner surfaces of the two wooden arches, which are to meet each other when the tent is inclosed, are covered with a thick layer of felting, and the two arches are fastened together by means of a rope and pulleys. This apparatus is a great improvement upon the old way of letting down the tent over the tree from above, and I see no reason why it cannot be used upon the largest orange and lemon trees.

After experimenting with a great many different gases, I have found nothing superior to hydrocyanic acid gas, produced by acting upon a solution of potassium cyanide with sulphuric acid.

Much will depend on the comparative purity of the cyanide used, and while it is not necessary that this should be chemically pure, still it should

not contain any visible impurities. One of the best tests of its purity is to pour a small quantity of sulphuric acid upon some of the dry cyanide, and if it evolves the gas in the form of a whitish vapor, the cyanide is sufficiently pure; but if it simply effervesces, without producing a visible gas, the cyanide will not answer the purpose.

The dry cyanide should be kept in air-tight packages, otherwise it will lose much of its strength. It is commonly sold in sealed tins, containing one and two pounds each, and should be allowed to remain in these cans until ready to begin operations.

For rendering the gas harmless to the tree, I know of no method superior to that of passing it through sulphuric acid. For this purpose the gas is generated in a closed leaden generator, furnished with leaden pipe leading into the top of a second leaden vessel containing sulphuric acid. The pipe from the generator should pass nearly to the bottom of this second vessel, and the gas will then be allowed to pass upward through the acid, and by a second pipe will enter the tent which incloses the tree; after this the air and the gas in the tent should be thoroughly stirred, and the tent be allowed to remain upon the tree about half an hour.

The acid, through which the gas had passed, can be used for generating the gas the next time, and fresh acid should be poured into the second vessel for the gas to pass through.

I will here briefly notice some of the objections that have been raised against the universal use of this method for the destruction of insect pests.

Firstly, as to the poisonous nature of the gas, and of the chemicals used in producing it.

While due care, in handling these poisons, should always be exercised, yet, with only reasonable care in this direction, no evil results will follow. When Professor Riley first advocated the use of Paris green for the destruction of the potato beetle, people in every direction loudly protested against the use of this poison, saying that its use would certainly result in the wholesale poisoning of children and farm animals, and by being carried by the plant to the tubers themselves, would thereby cause the death of every person who ate potatoes that had been treated with this poison; and yet at the present day no substance is more successfully used against manipulating insects than is Paris green.

Moreover, if the process of transmitting the gas from one tent to the other should succeed, as I believe it will, this will greatly lessen the danger of being poisoned by the gas, as compared with the present method of allowing the gas to escape in the air, as soon as the inclosed tree has been sufficiently fumigated.

It is also claimed that only a trained chemist can manipulate the production of the gas; but this is not true, since any person of ordinary intelligence can accomplish this quite as well as a trained chemist could. Of course this part of the work should not be intrusted to any and every person, but this is equally true in regard to the other methods for destroying insect pests, and I am sure your Secretary will agree with me, when I make the assertion that even the best washes that have ever been produced for the destruction of scale insects will, in the hands of careless and unexperienced persons, give only indifferent or unsatisfactory results.

In the matter of fumigating orchards, it would doubtless be desirable for certain persons to purchase the necessary apparatus, and then go from orchard to orchard, fumigating the trees, at so much per tree, just as, at the present time, the hay balers go from field to field, baling the hay at so much per ton. Already the cost of the apparatus for operating the tent has been very materially reduced; thus, the tent over the tree from above

costs all the way from \$150 to \$300. I am informed that the cost of the Culver fumigator will not much exceed \$100, while the apparatus suggested by Mr. Snow should not cost over \$50.

The only real obstacle to the universal adoption of this method is the present high price of the potassium cyanide.

For this I am obliged to pay in Los Angeles from 80 to 90 cents per pound, which puts the cost of fumigating an orange tree, twenty feet tall by fourteen feet in diameter, something like \$1 75 per tree. It has been the rule with every manufactured commodity, that when it came to be very extensively used, its price diminished in the same ratio, and we may confidently expect the same thing to happen in regard to the cyanide; but this is a phase of the question which I must leave to the fruit growers for their consideration.

Before closing I would like to give a little experience which I had in fumigating with tobacco. I had an upright earthenware furnace constructed, the interior of which measured about three feet high by eight or ten inches in diameter; this was constructed in such a manner that a Cumming's blower could be attached to it for the purpose of firing up the charcoal, and it was furnished with a pipe for conducting the fumes into the tent. I filled this furnace about half full of charcoal, and when this had been heated red hot, I threw upon the hot charcoal about four pounds of refuse tobacco stems, connected the pipe, and allowed the fumes to pass into the tent previously placed over a small orange tree; the tent was moved from the tree at the expiration of one hour, and it was found that all of the *Iceryas* were dead, as well as were also the black scales, *Lecanium oleæ*, and the soft scales, *Lecanium hesperidum*, but only a small percentage of the red scales, *Aspidiotus aurantii*, were killed, while the tree was uninjured.

Whether or not this method could ever be used against the *Icerya* on a large scale, I leave it to the fruit growers to decide; it is certainly much cheaper than fumigating with hydrocyanic acid gas, and almost every fruit grower could raise all the tobacco necessary for fumigating his trees, and at very little expense.

MR. COOPER: I should like to ask Professor Coquillett about the cost per tree in the application of the gas.

MR. COQUILLETT: Mr. President, in regard to this, I would say that I have only purchased the cyanide of retail dealers in Los Angeles, so that I could hardly give an estimate of what it would cost should it be obtained in large quantities. In Los Angeles, the price is about 80 cents per pound for the best grade of cyanide. The cost of fumigating a tree twelve feet tall by about ten feet in diameter ought not to exceed 60 or 70 cents; for a large tree twenty feet tall and fourteen feet in diameter, it would somewhat exceed \$1 75, not counting the labor. If this method is adopted, some steps should be taken for obtaining the cyanide in large quantities and at a reduced rate, a much lower rate than we are obliged to pay when we get it at retail. There has been considerable trouble in getting the proper quality; some persons have used the poorer grade and have not made the success they would if they had had the best grade. I would therefore advise that only the best grade be used on all occasions.

MR. COOPER: I understand from the explanation that in the event of a company of two or three or more persons, as would be necessary to undertake this and make a special business of it, that the cost would be about \$2 per tree.

MR. COQUILLETT: Not to exceed that.

MR. COOPER: And would not be required oftener than once in two years.

MR. COQUILLET: Mr. President, about repeating the operation, of course, that would depend upon the thoroughness with which the fumigating had been done, and also whether the trees treated were in the immediate neighborhood of trees that were infested. I am strongly of the opinion that in isolated orchards, with either the red scale or the *Icerya*, one treatment would be sufficient for two or three years.

MR. A. S. CHAPMAN, of San Gabriel: I will say that the trees I treated with cyanide, I think killed all the insects on them, but you put the tent on the tree, and a great many are knocked off on the ground, also a number on the trunk of the tree, and they come up again and increase on some of the trees, until they are nearly as badly infected again; but the trees are very healthy and very free from the red scale.

I would like to say that at Riverside, a year ago, Professor Riley suggested a kerosene emulsion forced through the middle of the tree in a very fine spray, enveloping the tree in a complete fog, and he said, "We could apply that at a very small cost and very rapidly." It seems to me with our present tents, if we envelop the tree in tents, that then we can put this kerosene spray in the middle of the tree, and spray the tree from the center, having the tent on the outside, at a very small cost indeed, with either a kerosene emulsion or a crude oil emulsion; that is Professor Riley's idea, except that I add to it, putting the tent over the tree to make the fog more complete, because, if there is any one thing it should be tight. There is a great deal of prejudice against kerosene, and I think it is because we have used it in such quantities and allowed it to run off the tree until it hurts the roots. It collects right around the trunk of the tree where it runs down, and kills the bark right at that point, and then the tree dies. The great advantage of the fog would be that there would be no excess, it would not fall from the tree, it would be like a fog around the tree and hardly any would reach the ground.

A DELEGATE: Would you spray from the inside of the tent, or outside?

MR. CHAPMAN: I would have the pump and material outside, and have a pipe, and have the fine nozzle right in the middle of the tree, inside of the tent. I have sprayed some trees about three weeks ago, both with the kerosene emulsion, according to Professor Riley, and the crude oil emulsion, and it looks to me as if the crude oil killed the bugs better than the coal oil. They were very badly infested, and after I got through there were a good many crawling up from the bottom, and they have since all died.

MR. COOPER: I should like to ask Mr. Chapman what nozzle or patent he used in spraying.

MR. CHAPMAN: I don't know which is the best nozzle; Professor Riley recommended the Bunch nozzle; I don't know; I have never seen it work. There are other nozzles; which is the best I do not know. I myself have always used the San José nozzle; it all depends on getting a perfect nozzle; in my own spraying I had a San José nozzle, and in the place of the little copper I had a leather with a very small slit, and I took my time and made fine sprays, for I was making a test of it. This material will cost, if you use crude petroleum, about less than a half a cent a gallon; but if you use coal oil it will cost you something like two cents a gallon; and five gallons of it would treat a tree that is twenty feet high and fourteen feet in diameter, which would cost, with the cyanide, about \$1 75 for the material, and when applied would be about \$2, and the kerosene would not cost more than 10 cents all through.

PARASITES.

Essay by W. G. KLEE, State Inspector of Fruit Pests.

Ever since the magnitude and extent of damage, in particular to the citrus fruit industry, by the fluted scale, *Icerya purchasi*, became impressed upon my mind, I have, on account of the omnivorous habits of the insect in question, become more and more convinced that it must certainly have formidable enemies in its native home, otherwise whole tribes of plants would be literally exterminated by it. I have thus far spent considerable time in trying to learn its native home, and to what extent it is kept in check by natural agencies in other countries. Professor Riley has also worked in this direction, and in my last report to the Board letters written on this subject, both to Professor Riley and myself, were published. Since reading the report of the well known English entomologist, Miss E. Ormerod, on the *Icerya*, I was much gratified in learning that in South Australia and in South Africa had appeared insects destined to check, if not altogether keep down, this terrible pest. In Africa it was the larvæ of a lace-winged fly and a ladybug; in Australia a dipterous parasite.

For the purpose of learning what help we might expect from these quarters in the far East, I addressed letters to Mr. F. Crawford, of Adelaide, South Australia, and to Mr. Samuel D. Barstow, of Port Elizabeth, Cape Colony, both these gentlemen having reported to Miss Ormerod the appearance at their respective countries of insects preying upon the fluted scale.

In December last I received an answer from Mr. Crawford, which speaks for itself:

SURVEYOR-GENERAL'S OFFICE, ADELAIDE.

W. G. KLEE, Esq., Berkeley:

DEAR SIR: I announce the receipt of your letter about the *Icerya* parasite with much pleasure, as I hope it may lead to correspondence that will be to our mutual advantage. I had intended writing to you about this very matter as soon as I found that I was in a position to do something, so that your letter has only caused me to write sooner than I otherwise would.

Since Miss Ormerod's little work was published I have made what I think is an important discovery, viz.: that one of our native coccids, a *coelostoma*, is likewise attacked by this parasitic fly. The *coelostoma* is a very large, sluggish insect, capable of living a long time without food, and one that could be conveniently sent through the post. I therefore propose to send you some specimens, of course taking the chance of their being attacked by the parasite. I will do the same with Maskell, in New Zealand. I might also try the effect of posting some *Iceryas*, as they might live long enough to survive the voyage.

The parasite so completely did its work that I have not a single *Icerya* left in my garden. I am now trying to introduce it again, but it has some other enemy that I must find out. Some two months ago I received a small branch of the common gooseberry covered with *Icerya* egg sacs nearly full size. One half, containing say fifty *Iceryas*, was placed in a lemon tree, two or three of the finest specimens being put separately. The other part, with about a similar number, was placed in a glass bottle. Now, at the present time, the gooseberry branch in the lemon is as bare as it could be—not a vestige of the *Icerya* is to be found; but that in the bottle is nearly as thick as ever, although two *coccinellidæ* larvæ have been living and fattening upon them for the last two months, while the bottle is swarming with myriads of newly hatched larvæ running about. This shows that the *coccinella* larvæ are not of great efficacy in putting down *Icerya*, but what clears off the rest in the lemon tree I am quite at a loss to make out, unless birds, and if so, in all probability the English sparrow.

My next experiment will be to cover over some *Icerya* (should I succeed in rearing some from the larvæ in the bottle) with wire netting, so that no bird can get at them, and then note the result.

I need not say that I have gladly accepted Mr. Crawford's kind offer, and that in due time I hope to receive the much valued consignment. I have also obtained the promise from the agents of the Australian Steamship Line, Messrs. J. D. Spreckels & Bro., of assistance in having the insects well cared for on the long voyage, as it must be remembered that

they have to pass the equator. If kept in a comparatively cool place, the chances are much better for their safe arrival. The box containing them will be placed in the ice chest.

The President of the Eastern Provinces Naturalist's Society, Mr. Samuel D. Barstow, writes under date of November 25, 1887:

Touching your favor of September ninth, which I was pleased to receive. The bug season is scarcely matured to insure a definite reply, but I will bear your request in mind, and do my best to comply therewith. The chief point of my somewhat strained experience anent injurious insects, is one which signifies a partial salvation to sufferers. They become injurious by preponderance, or as swarms, and this preponderance and swarming is fitful. The same may be said of their parasites. Again, a swarm of pests is no criterion for a swarm of parasites. Without a doubt, in this Province last season *Rodolia** and *Chrysopa*† worked miracles, which, though the human eye may not discover accurately after effects, reason may safely promise beneficial results. For my own part, I would honestly believe that a gigantic curse has been, at all events temporarily, averted by this remarkable appearance last season. Prior to this I never noticed them, and never heard of them prior to my own observations. What, however, does not appear to be so easily proven (probably through our not experiencing a big swarm) is the fact of *Icerya*'s disastrous proclivities. Many of our leading farmers and horticulturists disbelieve the fact, and I myself have not remarked the ruin which our western brethren and American cousins absolutely state as a consequence of the appearance, or shall I not say swarm. I sincerely trust the awakening will not come. I had always strong faith in natural opposition and contingency, and kept a sharp lookout, so if I can devise a plan to let you have my interesting little friends, and if I am again successful in finding them in quantities, you may rely upon hearing from me.

Rodolia, as a young larve imbedded in *Icerya nidus*, would, I think, with a little precaution, just land on your side in time.

So much in regard to what we may expect from other continents. I shall now turn to a place near by. A month ago I received from a friend in Hermosillo, Mexico, a small box containing several large egg masses of a *Mantis*, or *Rearhorse*, with these also a number of specimens of *Icerya purchasi*, in various stages, and a few days after this a letter followed, of which I give an extract:

Concerning the cottony cushion scale, in fact anything connected with horticulture, I can only give you my own observations, which are limited, as there is nobody taking any interest in such matters. The leaves and insects I sent you came from grafted orange trees about thirty years old on the Plaza, in Hermosillo, therefore somewhat protected from wind and frost. I am told that three years ago these trees were full of scale, and the next year they entirely disappeared without any observable cause. Last year I looked for scale, but could not or scarcely find any. This year there is considerable, yet it could be worse. Of course nothing is done against it. I find that in an orange orchard of the same age about a mile to the north, on slightly higher ground, although looking closely, no sign of scale. Nor did I find any on orange trees in Ures, sixty miles northeast of Hermosillo. The cold snap here killed all young orange trees to the ground. On a tree here I found a small, black bug with two dark red spots, which I did not want to send along for fear it would eat the scale.

Yours truly,

E. WOLLEB.

The *Mantis* eggs and scales I took to my friend A. Koebele, in Alameda, who thought as I did—that the *Mantis* might prove of considerable benefit in making war on the *Icerya*, although the disappearance of the pest in the Hermosillo Plaza could hardly be attributed to them. A close examination of specimens of *Icerya*, however, revealed that they were mostly eaten out on the inside, and a number of empty cocoons of a minute dipterous insect were found, and also several unhatched ones. The latter, in course of a few days, developed into minute flies, which, being submitted to Professor Riley, proved to be a species of *Phora*. The discovery of this apparent parasite led me to write immediately to Mr. Wolleb, to try to find some more infested *Icerya*, and also some of the ladybugs referred to. In answer

**Rodolia* is a genus of ladybugs. †Lace-winged fly.

to this, two weeks ago I received a small package of *Icerya*, with the following letter:

HERMOSILLO, March 14, 1888.

Yours of the sixteenth of February received. I have since examined the tree on the Plaza closely, but could not find any of the small black ladybugs I mention in my last, and found in only one instance an insect not pertaining to the cottony cushion scale species, which I send to-day by mail, inclosing more of your pets of different sizes and colors.

In haste yours,

E. WOLLEB.

Having to leave for the country, by previous engagement, I sent the whole invoice to Mr. Koebele again.

Calling on this gentleman the other day, I found, to my satisfaction, that although the invoice was very small, it had proved quite valuable. The insect Mr. Wolleb referred to was evidently the larvæ of a ladybug, as a very active species of this kind was found among the insects; but what, in our estimation, seemed to be most promising, was the fact that two thirds of the egg sacs of the *Icerya* contained well developed cocoons of the *Phora*. The *Icerya* themselves had nearly all been badly eaten out, thus showing, evidently, that the tiny insects found their support on *Icerya*. This fact has naturally made me very anxious to have this matter more carefully investigated, to learn definitely if in this minute *Phora* we have not a valuable ally. I call the attention to Mr. Wolleb's statement in his first letter, in which he says: "I am told that three years ago the trees were full of scale, and the next year they entirely disappeared, without any observable cause." As regards the probability of the *Phora* being the direct cause we have the testimony of the German entomologist, C. L. Taschenberg, who speaks of the destructive character of the *Phora incrassata*, which infest the honey-bee, causing one of the forms of foul brood. In most parts of Germany, Russia, and Sweden is this fly found in summer and fall on boards and in shrubbery, and crawls into the beehive for the purpose of laying an egg under the skin of the already well developed bee larvæ, before the cells are covered, and just so that the ovipositor is introduced between two segments, and the eggs are laid parallel with the long axis of bee larvæ, the head end of the former close to the head end of the latter. The grub must already be almost fully developed in the egg, as only three hours after being laid it breaks through the egg-shell and bores into the fatty body of the bee larvæ. It grows with extraordinary rapidity. Forty-eight hours after hatching it molts for the first time; twenty-four hours after the first molting it has reached a considerable thickness; again, after twelve hours, follows the second molting, and the growth is doubled, so that twenty-four hours after this it has a length of two and one half millimeters. After further twenty-four hours it measures nearly three and one half millimeters, molts for a third time, and is fully grown. About twelve hours after the last molting it changes its position in the bee larvæ, which is apparently healthy and at the same time has reached its development and has spun, turns itself likewise in the cell—turning toward the cover of the hind parts of the body. When the parasitic larvæ has turned itself, it bores through the main body of its host, through the wax lid, which closes the cell, lets itself drop, and changes, in the bottom of the hive, into a barrel-shaped pupa, or crawls out of the escape hole of the hive, and transforms in the soil. Twelve days after the fly hatches out and hibernates under the bark of trees. These interesting observations were recorded by Aszmosz. The infected bee larvæ dies and goes into decomposition. The *Phora incrassata* is thus one of the dangerous parasites, and the cause of one of the kinds of foul-brooded hives.

I have given this in full, to show the close observation of the naturalist, characterizing the insect as a true parasite, because later entomologists claim to have discovered that the *Phora* only attacks dead larvæ. However this may be, the presence of a species of this genus inside of partly eaten egg masses and dead *Icerya*, is very significant and worthy of further investigation.

The fact of a dipterous fly also appearing in Australia, as an apparent destroyer of the *Icerya*, strengthens my belief that we have a clew to a valuable friend. It should be considered that the very nature of the *Icerya* is such as might attract flies, and other dipterous insects, before any other insects, being as they are naturally drawn to foul smelling and soft, rapidly decomposing tissues.

While I have dwelt on the importance of importing these parasites, I would be very sorry, if it was inferred from my remarks, that my idea is to give up the fight by other means, for I have no such an idea at all. I believe that we must strain our efforts to the utmost, and keep up the gigantic struggle; it really is no matter what remedy we get, no matter how successful the fumigating processes are, there will always remain a vast amount of these insects in inaccessible places, where we can't get at them with our spray, and where these parasitic flies always will find enough to live on and help us. I have good faith in the fumigating process, and I believe that it is going to prove to be *the remedy*, and the mode of treating the orange trees; but I think people in Southern California have made a great mistake to give up the fight, and wait for that; although our modes of spraying are imperfect, they have been the means of staying the attack of the insect in other places. I have, since the last meeting, made some few experiments, and I fully agree with those persons that have tried the resinous compound in various forms. I think that those washes will be found very effective. The resin solution seemed to penetrate very much better than the other solution we have, better than soap, and succeeded better in sealing up the soft parts of the insect and closing them, and I think they ought to be used to a great extent. I have another solution here which I have tried on the black scale, which I think will be equally efficient: resin, five pounds; caustic soda, one pound; water, fifty gallons; sulphur, one pound; caustic soda, one pound; the latter sulphur and caustic soda, dissolved together by boiling, is added to the barrel; this sulphide of soda and the resin solution mixed, I find does excellent work on the black scale. I have not yet had an opportunity to try this on the *Icerya*, but I think it will work equally as well.

J. H. KELLUM, of Tustin: This is something like the science of medicine, which has been running a great many years, and yet is not a perfect science. Doctors differ, and our conclusions differ; our experiments, perhaps, may be similar, and yet we come to different results and different conclusions, which may, possibly, be owing in part to the different localities in which we live. California is made up of localities; climate is local, and soil, and hence what is true in one place will not be true in another. Between Orange and Tustin is a river, and on either side are two different climates; at one time at Orange it looked as if a blizzard had gone over it, while at Tustin there was no indication of any such thing. I came to this country in 1880, and I bought some land and paid \$65 an acre, and I bought my trees in a nursery close by, and had them put out, which cost me \$35 an acre; hence I found in March, 1881, I had an orange orchard of two thousand one hundred trees—eighty odd trees to the acre, that cost me \$100 an acre. Last year I sold the crop on that orchard, including seed-

lings, some twelve years old, poorly cared for, including the crop of those trees which was not large. I sold the fruit from that orchard on the trees for \$5,000. The year previous I realized about \$2,000; this present season I am selling the fruit by the box on the tree, at \$1 a box, and I don't know what the result will be. The crop would have been considerably larger but for the severe winds which we had in our valley during the winter.

Now, as to the black scale, it has been our enemy, we have fought it, and we have hoped and prayed that this Australian enemy of the scale would come in and help us out, and I think they have done it this last year. I do not think that in our section of the country we have one fourth of the black scale that we had in the previous year, and one half of my orange crop this year is as clean as any oranges you will find in Riverside, or on the foothills. In this new orchard, to my horror, I found about three or four weeks ago one limb on one tree out of the two thousand one hundred trees, where I found indications of the red scale. Now, I would not begrudge \$25 to anybody that would take that tree and kill the red scale, without killing the tree. I have not any of these means of killing the red scale; my plan is to take that tree and take off the whole head, and go after it with the different compositions and thereby exterminate the red scale on that tree. With regard to the paste I have tried it only in one instance, a year ago on a small tree that was bearing fruit and the fruit of the tree was covered with the black scale; it was close to my house where I could watch and investigate it, and I cut off all the foliage and made some thin starch, thick enough, however, to put on with a brush, and I bought me a small brush and went over that trunk and what was left of that tree, and I said to myself, if there is any scale on that tree it is fastened there and there can't be any locomotion certainly, and I watched that tree from week to week, and concluded that the starch was a success so far as that persimmon tree was concerned, and lo, and behold, the branches started out the coming year and the tree bore fruit, notwithstanding I had pared it down as I did; it bore three persimmons, and to my horror, one day I went to examine it and the foliage was covered with the black scale. That is all the experience I had with the starch compound.

MR. KINNEY: I was going to say that the experience of the gentleman who has just spoken in reference to the black scale was an observation of mine. About three years ago, I noticed on the brush in the old cañon of Santa Monica, an immense quantity of black scale, principally confined to the artemesia; the brush was dying back from the top, and I expected to see that brush entirely exterminated in that locality. Lately, about a month ago, I was there, and on the same brush you could scarcely find a single black scale; what it is owing to I do not know, but that is a fact. About the same time there was a scale that appeared on the Cañada Rancho in the brush also. I have never seen it on any fruit trees, and I do not know what the name of the scale is, probably these gentlemen can tell; it is a white scale, varying in shape, perhaps, containing the same superficial area that a black scale would, only different in shape, with an exceedingly hard shell. It was on what we commonly call here grease-wood, and was killing that; the brush died back from the top; that scale has disappeared also. Now, I have never seen that scale anywhere else except on that particular ranch, and I do not know what it was. Now, these scale bugs do die out, because we have never had any trouble in the foothills where I live, at all; the black scale never has troubled us, but the red scale is the enemy that we dread. It seems to sap the vitality of the tree to such an extent, that if anything comes along in the shape of a wind, the tree will not hold what oranges it has, but will lose them; not only that, but what oranges we do

get on infested trees are covered with this scale, and the sale of the fruit is very much deteriorated, and we can't get a good price for it. Now, this spraying with flour is a successful thing, it is a cheap thing; and it seems to me that it ought to be more extensively tried and experimented with. I have heard about it a good deal and I am going to try it. The red scale is an exceedingly difficult scale to get at; it don't fall off the trees, and it does not seem to breed in the ground; you can exterminate it, because it has been done. It is not generally known that the red scale attacked an orchard in Riverside; it did, and the neighbors of the gentleman went to him, and talked to him, and he made up his mind himself as to the danger from the scale, and he destroyed the orchard. It was only a small one, something like ten or fifteen trees, so you could hardly call it an orchard. He cut them down and burnt them up, and the red scale has no foothold in Riverside whatever. But you can find black scale; I have seen it there myself in the gardens, in Mr. Gosbee's place. I have seen it there myself where the garden is very thick with foliage; it prevents the sun and dry air from circulating, but it does not amount to anything, it has no strength in that climate. But if they ever get the red scale there, it will be very serious. I merely state that to show that you can get rid of the red scale.

Now, the white scale, that is the fluted scale, is so different from the other scales, and so characteristic, it is easier to kill—the individual is easier to kill, I believe, than almost any other—it confines itself very largely to the main stump and the branches of a tree; it gets into the foliage later, but it does not, as a rule, prey on the foliage; it is almost entirely confined to the bark; it is attached to the trunk. The greatest trouble that I have had with the white scale on my place is the fact that that scale there lives and breeds in the ground, or goes there and lives long enough to get back on the tree. That is the greatest trouble that I have had. Now I can go with a spray and kill every white scale there is on the tree. I have got a spray that does that, but I do not think it kills the eggs, probably it does not, but at any rate you can practically kill nearly every one there is on the tree if you are careful; but you go to that tree four or five weeks afterwards, and you will find more white scale; you can see the little ones climbing up the tree in considerable numbers, or a tree that has never been infested will have a good many. There is the trouble, after you have killed the white scale, you have not killed it; that is, there are enough in the ground, and around that tree, to go up there again. On my place I have observed the scale breeding apparently, or living on the crown of the tree, a little under the ground, so that, in treating the white scale, it becomes important to examine the bottom of the tree, to see if there are some of them there. I find that they are often very thick; that may be owing to the peculiar treatment that I have given my trees. I have a system of irrigating them with basins, and that may have something to do with it.

MR. BALDRIDGE: The gentleman has called your attention to a fact that is not given sufficient importance to: that California is a country of localities, and what will apply to one locality will not to another. I apprehend that is the main reason why there is so much conflict of opinion in regard to methods. The conditions are not fully and faithfully stated under which results were received. Now, my climate is altogether different from yours; it may be possible that the humidity in your climate would prevent the effective working, to some extent, of the starch. I put it on very thin; I judge you use it thicker than I do, and in a humid climate it might not dry and do as well; with me, the air is very dry, and I put it on very thin, and spray it faithfully; the coating is exceedingly thin, and it cracks, and all comes off and leaves your tree perfectly clean; it does not injure the

foliage, or the fruit, and it takes all the dirt, all fungus, everything with it, both off from the foliage and the limbs. Further, I have a couple of large oleander trees, and I believe the black scale are harder to kill on them than they are on the olive, and I have tried this on those two trees with very satisfactory results. I examined them the other day, and found only a few alive, and I think another application or two will clean them entirely, whereas, they were before literally a mass of black scale. I would like to ask Mr. Klee how he accounts for the fact, that in an orchard of two thousand trees, five trees scattered at various points over the whole orchard are a literal mass of scale, like as if they had been deposited by a fly, and the rest are perfectly clean?

MR. KLEE: The only answer to that is that they happen to be upon those trees and, gradually increasing, make the tree unhealthy, and they live better on that tree.

MR. BALDRIDGE: They make their appearance there at once; there has never been any there before this year in trees two years old.

MR. KLEE: It must have been brought there by something, no doubt by birds. I think that is the most rational thing to suppose. I see no reason to think they are produced on the tree from nothing; they come from a mother insect, and that mother insect must be brought by some agency, and that agency is generally a bird or other insect.

MR. BALDRIDGE: What astonishes me was that they could bring enough to so thoroughly infect a tree at once.

MR. KLEE: I have seen in the midst of an apple orchard, where there was the nest of a bird, one limb totally covered with the scale, just on that one tree, right in the midst of that orchard, and on the limb where this was the limb was literally covered with the San José scale.

MR. J. W. SALLE, of Pomona: With regard to the pest, I want to say a few words. The red scale infests the fruit and foliage more than it does the tree or its branches. The fluted scale lives principally upon the tree and the branches; the red scale is a very delicate, fibrous scale; the paste, when put upon the tree, will only crack and come off of the foliage and the fruit; it don't come off of the butt of the tree, the rough bark; however, it attaches itself to the red scale and takes the scale off with the fungus of the black scale also, from the leaf and from the fruit, but it does not peel and take the scale away from the body of the tree, or away from the branches or rough bark of the tree, consequently the paste is very efficient against the red scale, while it does not affect the San José scale or the black scale but little, except to remove the fungus of the black scale from the leaves. It does that, but it does not take off the old scale bugs or carry them away, neither does it take off the white scale. When you put the spray on it, in less than twenty minutes it would take and run off with the paste; it will do it in twenty minutes from the time the paste is put on; that is, the white scale; but the red scale is easily taken off by the paste, and hence those orchardists around Orange, and other places, have made the raising of fruit successful by the use of the paste. A little over a year ago I tried paste upon the San José scale, put on two applications, so as to have the thing thorough, and was satisfied that the tree was thoroughly treated, but the season showed that the bugs were not killed, that they came on later, and were on the tender branches of the tree. I want some of you gentlemen from the north who have had a good deal of experience in treating the San José scale to give us some information about it. It is a hard bug to handle with us. On some young pear trees I found some of the San José scale, and treated the trees with pure coal oil twice, at different times, put the coal oil on with a paint brush, for the trees were small,

and I wanted to kill the bugs, but I didn't do it. That year the branches came out from the stump, and in more than half the cases the bugs were there, too, on the new growth.

There is another side of the scale bug question. We have got an immense country in this State of California, different localities, different conditions. As has already been stated, it is not every locality that is suitable for raising the best kind of oranges, or the best kind of prunes, or peaches, or pears. You can't go anywhere in the State of California and raise them all. If you could raise the best oranges for market on the low, damp lands, near the ocean, where they do not need any irrigation, that would be all one vast orange orchard; but you can't do it, the scale bug comes, the black scale, and makes it all black and smutty, and you can't sell it for much; so with other varieties of fruit. I have prepared a few statistics. The amount of oranges consumed in the United States is about eight million boxes; the number of trees necessary to bear that, counting two boxes to the tree, is four million trees; that is the entire United States. We will grant Florida a million and a half, and we will take two and a half million trees in California. Now, the number of acres of land to grow this fruit on, at eighty trees to the acre, is thirty-one thousand two hundred and fifty acres. The number of trees already planted in the State of California is about two million, to say nothing about the immense area of the northern citrus belt—about two million trees planted in Southern California. Two and a half million is all we need to raise the requisite amount to supply the United States, to say nothing about the supply that comes from the Mediterranean; we are going to absorb all that with a protective tariff. Well, the number of acres of land now suitable for first class citrus culture in Southern California—and I do not mean the low land next to the ocean, I mean where the conditions are perfect, as we have got them—is seventy-five thousand acres, more than twice as much land as we need to raise the required amount, and for the next season's planting we will want more than two and a half million trees. What are we going to do with all that fruit? The scale bug comes in and tells you exactly what you are going to do with it. This is the only relief you have got—the scale bug. Old nature knows more about it than we do, and we are here to-day to find the conditions that nature intended we should improve for citrus culture, and for fruit culture of all varieties. We are going to find those conditions.

MR. A. SCOTT CHAPMAN, of San Gabriel, offered the following resolution:

WHEREAS, There are \$20,000,000 invested in fruit culture in this State; and, whereas, this may indefinitely increase if given the proper conditions; and, whereas, the white scale bug, *Icerya purchasi*, threatens the very existence of the citrus fruits in this State, as well as numbers of the other fruit trees; and, whereas, it stands to reason, that there are parasites for these different scale bugs, in the places of their nativity; therefore, be it

Resolved, By the fruit growers of California in Convention assembled, that the United States Congress be petitioned for an appropriation of not less than \$50,000, to be used by the Department of Agriculture, for the purpose of sending experts to those countries where the baneful insects are known to have originated; to discover, if possible, their natural enemies, the parasites, and introduce them to this country; also that the Department of Agriculture be enabled to make actual experiments here in the field, to, if possible, overcome these injurious insects, etc.

MR. SALLE: This is in accord with the position I take, that nature should afford us a remedy and horticulturists should look for a natural remedy for the scale bug, and this certainly is the proper way to do it. There must be natural enemies to these scales, for they are natural enemies to mankind, and nature must afford some natural enemy to them, and we want to find it. We want to find the parasite that preys upon them; we have been unable so far to do so, although there has never been a concerted

effort upon the part of the fruit growers of the State, and this certainly would be the most practical way to get at it. I most heartily support the resolution.

The resolutions were adopted unanimously.

MR. SALLE: Nearly all the insect pests have been imported to Southern California, and at the present time we are on the eve of an immense planting boom, and there is not and will not be for the next two years, sufficient nursery stock in our part of the country. I do not speak for the northern part of the State, because I do not know the condition, but in the southern part of the State there will be an immense number of trees imported within the next two years. At our last County Pomological Society meeting, we passed a resolution recommending to people of Southern California to be very careful in the importation of trees, not to get any other injurious insects in addition to those we already have, and in the same resolution we cautioned them also to be particular about the variety that they were planting. This is not exactly on this subject, but it comes under the same head. I don't know but what a resolution of that kind would be very appropriate here. Many in their frenzy and their wild ideas of boom to improve, they forget about the dangers that may come from importing trees, but we have the past sad experience to guide us in the future and we ought to profit by it. I think that men should be very careful in importing stock from other countries. I was East this winter in my native town, in Missouri, and we were talking about scale bug in connection with other subjects, and some of the parties that we were talking to wanted to know what they looked like. "Well," I said, "I guess I could show you"—there was no oranges then from California, but all from Florida—"I guess I can show you if you have any oranges." Well, we went around to the grocery store, and from the very first box of oranges I picked from, there were two different varieties of scale, and both distinct from anything we have in California that I am familiar with; making it appear just as bad as our scales out here do. We are importing large quantities of oranges from Florida, and are most sure to get those scales. We have got to bring prune trees, and peach trees, and apricot trees into Southern California, from somewhere else. The real estate boom of the last two years has absorbed everything, not only the orchards and vineyards which are largely going to waste and the fruit to rot upon the ground, but it has dug up all the nurseries and taken up all the nursery stock; that is to say, there was none planted, and we have got to have the trees the next year. If you have got any scale bug up in the north we don't want you to send them down here, and we don't want to send you any. I don't know that the resolution would be in order, but the remarks certainly are.

MR. KLEE: Too much stress cannot be laid upon what Mr. Salle refers to. There is great danger, undoubtedly, and I have called the attention of the fruit growers to the fact that we receive large importations of orange trees from Japan. I have endeavored to have everything obtained from there thoroughly disinfected; yet some may escape. There is no good system about appointing any one to look after it, and it rests with me largely to see that it is being done. Now, these trees, of course, that come from Japan, have to go through San Francisco, but orange trees come from Florida, and there it is well known they also have bad scale insects; some are not so bad as they used to be, as some varieties there have parasites now. It is probable that the first few years, at least, after they were imported here, they would prove equally as bad as anything we have, and we would have to go through a period of terror in regard to them; hence I believe that no shipment from Florida or any other country should be

planted without being thoroughly disinfected: each tree dipped singly into a solution treated in that manner, I don't think that there is much danger; I doubt that all of the trees that have come from Florida have been treated so; I believe that a majority of them have. All the nurserymen that I have come in contact with have promised me to attend to it; but in a State of this size, with so many places from which trees may come, it is impossible to keep track of all the nursery stock, and it must rest upon the people at large, or each locality, to see that we are protected. I think that the formation of local horticultural associations, or whatever you may call it, who may appoint some one amongst their number to look after this, would do a great deal of good in that direction. I have always been urging the formation of such societies, and for that reason, if for no other, it would be very wise to have them formed.

Vice-President IVISON in the chair.

MR. COOPER: I have been using the kerosene emulsion, as laid down in the Horticultural Report of 1885, for several years. I have adhered strictly to the proportions and the manner in which it is to be prepared, as given in the report.

Three years ago I purchased in San Francisco five different kinds of kerosene oil; all came down in one invoice, and four of them I found to emulsify very readily, and to hold the water in solution after being diluted. Last year I did not do anything; I was East, and neglected my trees, especially the olive trees, and they became thoroughly infested with the black scale. I have not seen anything the like of it since I have been on the land, so that I determined this winter to give them a thorough spraying. The best time to spray an olive tree is in the months of January and February—late in January, because they commence to hatch in the month of July, and keep on until the first of February; there is no question about it. You will find them on the olive trees from a size which you can scarcely perceive with the naked eye to almost a full grown, mature scale, at the same time; and while milder washes will destroy the minute scale, it has no effect whatever upon the mature insect, and, so far as my experience goes, there is nothing short of caustic soda or kerosene oil that will destroy them. Caustic soda is very dangerous to handle; you cannot employ men who will endure the unpleasantness of using it so strong as it has to be used to kill a mature black scale on olive trees, and they do not object to using kerosene oil. We had so much rain in Santa Barbara County in the months of January and February that we could not get on the ground with teams, and we had to postpone it until late in March. I ordered from San Francisco the first invoice of three hundred cases of kerosene oil, without designating the particular brands. The oil was sent down, and I commenced washing in the usual way, with about seven gallons and a half of water to one of kerosene oil. After three weeks—that is, three weeks after the first washing—I found that a great many of the olive trees had lost all their leaves and the ends of the branches were killed; and, by further investigation, I discovered that the first trees washed were washed with water, and the last trees were washed with oil—that is, that the oil did not hold the water in solution. I then investigated further. I had the same man that had been emulsifying, the same man that had been washing—there was no difference in the care. Then I purchased, in Santa Barbara, such brands as I could get, for experiment, and I found that while there was no apparent difference with regard to burning qualities of different marks of oil—each having on the outside of the cases "150° fireproof test"—that one quality of kerosene oil would hold the water in solution, while another, of the same test, would not hold it. This difficulty I had not experienced

before, and I attributed it to the fact that the low prices of kerosene oil probably induced a very serious adulteration, and I am convinced that such is the fact. I stopped using the kerosene oil I first purchased, and ordered two hundred cases more, so you see I am not dealing in kerosene oil in small quantities. I use more kerosene oil, probably, than any man in the State of California, for spraying purposes.

I found that an oil that I purchased in Santa Barbara, "Pearl Oil, Blue Mark, Cincinnati, Ohio," put up by the Standard Oil Company, would emulsify by passing it through the pumping operation about six or seven times, while Elaine oil—which is considered by people who use oil in Santa Barbara as the best for burning purposes—required about ten or twelve times; the Astral oil required about thirteen or fourteen times. All these oils were put to me at the same cost, so I confined myself, for the time being, to the Pearl oil, as it held, or seemed to hold, the solution of water better; and I was not pumping pure water on the first trees—pumped from the tank—and pure oil on the last trees. Now, this has been a very sad experience to me; because, while it could not be discovered in the spraying operation, such was the fact. It was used by the same men who have washed trees for me for the past five years. I gave considerable attention, after the oil appeared emulsified, to watching when the boiling water was poured into it, in order to thin it sufficiently to put in the tank; and I found that while some cases of oil, just as soon as the boiling water was poured into the barrel where the emulsified oil was, that the oil would rise to the top; others you could fill up the barrel with boiling water, where it was in solution, and the bottom of the barrel had just as much oil as the top; so that I am getting rather doubtful as to the coal oil business, unless I know what coal oil it is.

This experience I have not had previously. It takes about three weeks after the washing is done before you can tell the effects of the coal oil on the trees; then we find all at once that the leaves are gone, and then the ends of the small branches are dead; and your crop is gone for that year at least, possibly the next. This same spray has no bad effect on the orange tree. I have some orange trees that have been washed by the same men and the same mixtures at the same time, and it does not injure the bloom; it kills every scale on the tree; that is, the black scale, and the soft orange scale, and another variety of red scale which is to be found on my ranch (those three varieties on the same tree); kills every one of them wherever it touches. By one washing a year of orange, lemon, and lime trees, I can keep them as clean as they are in Riverside. There is no difficulty at all with the kerosene emulsion, in regard to the strength of it. Cut all the leaves off, no matter, the bloom is there; they are blooming out now, and they will have more on than they ought to have, and so with the lemon. But the same operation has no effect on the olive tree; it is most simple, for while it is successful on the orange, it has but little effect on the olive, side by side, the same scale, the same men, the same oil. Those from abroad who have an opportunity of making an excursion out to the place, to-morrow, will see the effect of this oil on olive trees, as well as on orange, lemon, and lime trees. I have subjected them all to the kerosene emulsion as being the most effective, and the only sure remedy for the black scale, that I know of. It should be used in January and February, and one washing will generally reach all the black scale and keep it in subjection without injuring the tree. The trees commence to grow about the first of April, so that, if washed in February, it will have the whole month of March to rest and do nicely, and the blooming will commence about the thirtieth of May, and it will bear a full crop; but if

the washing is done after the fruit buds and the young tender leaves start, you will destroy your crop for that year. Washing in the fall will not answer, and rain in January, February, and March will make it impossible to get on the ground; interferes with the whole business.

A DELEGATE: I would like to ask you if this kerosene emulsion is effective on the *Icerya*, or don't you have any?

MR. COOPER: I think it will kill the *Icerya purchasi*, or any other insect. I have no *Icerya* on my place; I had one tree three years ago, and I have treated once a year quite severely with kerosene emulsion, and I think there are no insects on that tree now. I, of course, did not cut the tree down and burn it up, because there were only about a dozen citrus trees in the orchard, and I determined to see whether it could be kept in subjection; I did not care if it did spread to the other trees. It has not spread to the other trees, and there is no perceivable insect—that is, *Icerya*—on the trees that were not infected, and it had no treatment that an olive orchard could not have. The emulsifying of kerosene oil, etc., is one of the most difficult things to handle; it must be done well, otherwise you see the ill effects of it.

MR. BALDRIDGE: In view of the fact that there must be an immense amount of spraying done, and many men are likely to repeat your experience, and get no result for the loss of time, trees, and fruit, it has occurred to me that it might be possible, through this organization, to make some arrangement with some refining house, and preparing the standard oil for that purpose for the State of California, upon which they could guarantee to a certain standard, and upon which everybody could rely.

MR. COOPER: I might say in addition to what I have already said, that one great difficulty in spraying trees in a large orchard is this: It takes five men, with a good team, six weeks to spray my orchard, and if we could do it in the fall of the year, when the ground is hard and the conditions favorable, it would be a very simple process, but it must be done in the months of January, February, or March, in order to affect them, and those are the months that we are liable to have most rain, when it is impossible to get on the ground. The other simple remedies will not kill the black scale on the olive tree. The starch will do, I suppose, when it is first hatched out, but by the time you get over the orchard, when it takes you six weeks, you would have to commence a second, and perhaps a third time, and if it be repeated five or six times, the labor would be too expensive. Caustic soda, too, on trees of a sufficient strength is too severe; it would kill all the trees back before you probably are aware of it. I have many trees that never have recovered from too severe solutions of caustic soda, but as the gentleman stated, the question of kerosene oil is a very serious one; if you intend to adopt the kerosene emulsion, there ought to be an organized plan by which we could secure an oil that we could depend on, and not buy, as I have this year, three hundred cases of an oil that I cannot use, and most of which I am now trying to sell. And not only that, but you find one half of the trees severely injured, and the crop of this year killed.

MR. CHAPMAN: I made some emulsions about three weeks ago, one from crude petroleum, that emulsifies very well and dissolves in water, and the oil does not part from the emulsion. I don't know what kind of oil I used, very likely the Pearl. The petroleum came out a sort of a gray color; to start in with, it was perfectly black.

MR. COOPER: The Department of Agriculture in Washington does not recommend crude petroleum. I bought some crude petroleum very cheap (about four dollars a barrel) that came from Ventura, but we could not do anything with it, and I made up my mind that the experiments made by

the Agricultural Department at Washington had thoroughly tested those matters and gave it up. They recommend the best quality of highest refined kerosene oil, and I have uniformly tried to adhere to the plan laid down by the department.

MR. CRAWFORD: I would like to ask Mr. Klee if he has ever experimented with the lime, salt, and sulphur wash on the San José scale?

MR. KLEE: No, I have made no experiments with it; I have read a good deal of it. It has been used in Tulare County, and there was quite a report of it at the last meeting from the Tulare County Horticultural Commission, recommending it very highly.

MR. PECK: I would like to say, in answer to the gentleman's question, that in Placer County that remedy was used with good success last year and this year.

MR. CROFTON: I used it this year and last on trees that were badly infected with the San José scale; I made a preparation and sprayed the trees; of course they shed their leaves, but I found it killed all the scale. We find the scale on the Sacramento River, around the crown of the tree below the ground on the roots. It probably is the case with some of the gentlemen here to-day, that in spraying or washing their orange trees, that they do not take the dirt away from the roots where the scale may be, and they increase from that. I have sprayed with this lime wash; it is very easily prepared and I think it is a good wash, and I have done almost all my spraying this winter with it.

MR. COOPER: I have tried the lime wash very thoroughly on the black scale on the olive tree. It will not answer. The most efficient remedy that ever I happened to try was a preparation made in England, called Cooper's sheep dip. I tried it on the olive trees exactly as they used it for the scab on the sheep, and in thirty minutes it killed every scale that was on the trees, and in three or four days the tree died. I have not used any more since. The manner in which I used the sulphur and lime was taken from a report of the Los Angeles Convention two years ago; two pounds of sulphur, one pound of lime, and three gallons of water, boiled about one hour, and add three gallons of water to one gallon of the mixture. There is no salt in that.

MR. CROFTON: I use in that a pound of salt to a gallon of water.

MR. G. M. GRAY, of Chico: We have been trying this salt and sulphur remedy in Chico, and thus far we have not met with very good success, although we kill a great many scale. We did it as thoroughly as we could, but on very large cherry trees it is difficult to reach the tips of the limbs. I would like to ask the time of year when they have met with the best success.

MR. PECK: I should say in our county we commence about the first of March.

MR. CROFTON: I tried it last fall, in September. That is, when I first applied it; it killed all the scale on the pear trees at that time; of course, the leaves shed too; it burnt the leaves, but it killed all the scale, and the tree is coming out very nicely this year.

Here the Convention took a recess until half-past one o'clock.

AFTERNOON SESSION.

The Convention reassembled pursuant to adjournment.

APPLE CULTURE.

Essay by O. N. CADWELL, Carpenteria.

The apple is monarch of fruits for the temperate zone. Much is expected of the apple, and no fruit responds more bountifully for labor bestowed upon its culture. I believe the apple has a bright future even in Southern California. If I were about planting trees for profit, apples would come first, and more of them.

As to varieties, let us see what kind do the best in our vicinity. Many varieties that do well further north may fail in some respects here. Here the Yellow Bellflower excels. You may start at the northeast corner of Maine and look carefully all the way to the Pacific, you can find no Bellflowers more luscious or beautiful than those grown here. I have seen many of other varieties just as good as need be grown anywhere.

We can select varieties that do well here, that will give us apples from July to April. Every owner of a few rods of land for a home, should raise at least apples for the family. If your room is limited, do not let the ornamental crowd out the useful. A nice apple tree is very pretty, and none more useful.

Red Astrachan comes first for early, giving fruit every year, and a good grower. Yellow Harvest is of better quality and a little later. Fall Pippin is a splendid apple for the family. Yellow Bellflower and White Winter Pearmain, with those already mentioned, make up a good variety for home use. More apples and less pork brings more health and pleasure for the children.

For the market there is such a thing as having too many early apples at one time, in the season with the rush of other fruits, but as yet we have not been able to supply the market for late-keeping apples; some other place has furnished the apples and taken the money. With proper care and selection of varieties, we can raise the apples and keep our money at home.

PLANTING, PRUNING, ETC.

Be sure you have good trees, with strong, clean roots, to begin with.

For a family orchard, trees of three years or more growth can be safely moved, and have fruit right along.

For the orchard, good strong trees, one year from bud or graft, are best. Twenty to twenty-five feet each way is near enough to plant, and often thirty feet or more is better.

Be careful not to set your trees too deep.

As to pruning, I have no arbitrary rules, except I want my trees branched near the ground. After planting, cut your tree off twenty inches to two feet above the ground. Use your judgment about the number of branches to let grow, but keep the tree well balanced, so as not to grow too much one-sided. Cut back enough to keep the branches strong, and trust a good deal to nature to make a good tree, after getting a start in the way a tree should grow. If you are going to put a two-story top on your tree, do so at once, or as soon as the body will be strong enough to carry it. Cut the branches well back, or the first heavy crop of fruit will either break or bend the branches down all around the body of your beautiful tree.

I have not dwelt so much on the varieties of late-keeping apples as I should have done, but I have not had experience with their culture. Many of the late-keepers of the north will not do so well here. The Yellow New-

town Pippin does very well, but it does not keep any longer than the Pearmain; that is my experience; it is a very good apple, however. In selecting apples for future planting, let us be careful that we get the varieties that keep, and we will save ourselves from loss.

MR. BALDRIDGE: Have you had any experience with the Newtown Pippin, as being a longer keeper here than it was back East?

MR. CADWELL: The Newtown Pippin is a very good apple here, but you will find that it has lost its acidity in a great measure. None of the apples grown in the East, that we have had any experience with, including the Greening, and the Russets, have got the acidity; they are not as tart as they were there. As I mentioned in the essay, the seedling apple comes nearer the apples we used to eat there when we were boys. I know my taste was very keen when I was a boy for a good apple, and some of the seedlings remind me very much of them. Some are quite tart, and some quite sweet. The Greening does not keep. The Fall Pippin is a fine apple for family use, but when the market is full of grapes and pears, and everything in the way of fruit, our apples go for little.

MR. BALDRIDGE: It seems to me that the Newtown Pippin could afford to lose some of its acidity, and being a good keeper, it would be a fine apple.

A DELEGATE: Have you any experience with the Northern Spy apple? We raise it, and it is the finest apple I have seen in California; it is very tender, and I have never seen it elsewhere.

MR. CADWELL: We are troubled considerably with the woolly aphis. We have none of the codlin moth in Carpenteria; I have not seen a codlin moth there. I have not been successful in destroying the woolly aphis during the fifteen or twenty years that my apple trees have borne, since I have been here. It is time, certainly, that they were replaced with new trees.

MR. KLEE: How is it with Spitzenberg?

MR. CADWELL: I have seen fair looking apples, but they don't have the flavor of the New York Silver Spitzenberg, or in the Sierra Nevada Mountains, where I have eaten apples from seedling that was grown, I suppose, from the Silver Spitzenberg. On the trees I had in Lake County there was a Spitzenberg that was growing by a row of Winter Greening, and this seedling had a good deal of the Silver Spitzenberg, and the tartness of the Greening, and was a very fine apple. I have taken pains and trouble around the country with any one that has raised the Silver Spitzenberg apple and know the tree, and it is an apple that has a luscious flavor, one of its own.

MR. IVISON: I would like to ask Mr. Cadwell why it is we do not have the sweet apple, as we used to in the East?

MR. CADWELL: That is a question that is pretty hard to answer. I have sold seedlings that were sweetish, but I have not seen the sweet apples of the East. That is a question that cannot be answered, unless it is, I suppose, because we are in California.

MR. SALLE: There is no place in the world that can raise an apple that makes a better appearance, or gets a better size, than the low, damp ground of Southern California, say down in Westminster, Los Angeles County, where it needs no irrigation; the trees live but a short time, however, and the quality of the fruit is much inferior to apples raised on high lands, and they do not keep so long. I live at Pomona, at an altitude of a thousand feet, and this territory I have spoken of, is one hundred feet probably above the sea level. We have in our markets at Pomona, first, the apples from the low lands, and they disappear along in January or February;

then there are apples from the valley of Pomona, one thousand feet altitude, which keep much longer; but the best apples I have ever seen in Southern California are raised at an altitude of two thousand feet, upon the San Antonio Cañon, where there is an apple orchard twenty years old; and I do think the fruit raised there, in flavor, keeping qualities, and in every way, compares favorably with any fruit that is raised East. I certainly would not advise any one to plant an apple orchard for profit, on low, rich land. If they have rich land at a great altitude up in the mountains it may do, but there is no one that raises apples for profit in our part of the country. I do not know of anybody that brags about the profit they have got off the apple orchard.

MR. CADWELL: The profit comes in by having the fruit when there is a demand for it. I tried to get long keeping apples. These apples that are raised on this moist land which the gentleman speaks of, who certainly could not brag of their quality, of course they got hard knocks, as a great many of our apples have done; but there is quite a few apples that have the exquisite flavor of the apples grown East. The Rambo does not have that flavor here that it does have in the mountains; the Bellflower has a flavor as good as any Bellflower grown in any other part of the world—that is my opinion, and it is one of the finest apples; the White Winter Pearmain is just as good here as any I ever saw anywhere. The Fall Pippin's flavor is just as good, and is a nice, fine apple, and why the Greening does not do as well I do not know.

MR. BALDRIDGE: I have a small apple orchard, planted as an experiment, an orchard of some seventy-five trees, including a number of varieties. My land has citrus conditions, as the color and flavor of the orange indicate, but it will not grow apples; the sun bakes them on one side, and they get all mixed up in their blooming. They don't know whether it is this year or last. I do not see any good in them, and I shall have to take them up.

MR. GREGG: One kind of apple has not been mentioned, and that is the Canada Red. I think they stand the hot weather perhaps better than any other that is raised in the Sacramento Valley; they keep long, and are more brittle, hard, late, and quite tart. I think the time is coming when the culture of apples, especially those that will do well in the warm valleys, will be profitable, and that the fruit will find a ready market. We have several kinds planted out that are claimed to fill this need, but they are not in bearing yet, so I cannot speak from knowledge what the result will be.

MR. CADWELL: My experience is a good deal like that of the other gentlemen; that the apple tree didn't know where she was; it troubled me a good deal when I first came to Santa Barbara County. They didn't bloom until June or July; some years they came out prematurely; some years they bloomed all the time. But after living here three or four years, and letting the trees grow, I found they had an abundance of apples every year, and it made no difference whether they didn't wake up till July, we had them every year, no frost to check them off, no sun to bake them. We had plenty of apples in this vicinity, and we can keep them up fairly until April.

MR. HEATH: I have had some slight experience in apple culture in Santa Barbara. The rule in Spain and France is, that where the orange grows to perfection, the apple ceases to be of any value. Although I knew of the existence of this rule, being a New Yorker, and fond of apples in my early days, in examining the old Mission propagating gardens here, I found that the padres had a variety of apples; those seedling and what would be considered to the American taste an inferior apple, but really a fine apple for

making pies and keeping well. Seeing those experiments I resolved to try, and planted a good many varieties. Of the different varieties, I failed more times than I succeeded, because of the existence of the surrounding circumstances. The apple, really, is a cold country fruit; it is not a semi-tropical fruit, and when you speak of hard apples you must remember that as you approach the tropics you lose the tart of the apple always, and while we are here in Santa Barbara in the latitude of Charleston, South Carolina, you really have a climate similar to Vera Cruz. Yet, while in Mexico, the apples cease to grow and be of any value, here in Santa Barbara we raise fair apples. I raised several varieties that did well, and in the early days I got fine prices. The Spitzenberg I tried with other apples; the trouble with it here is, that it fails to produce its fruit in even size, and the acid of the fruit was lacking. It was not a New York Spitzenberg, nor could we expect to have that in the climate of Vera Cruz. We have some varieties that do well. The Roxbury Russet is equal to the choicest Roxbury Russet that is ever grown in Massachusetts. I have placed them before gentlemen coming from that State, who pronounced them equal, if not superior, to anything they ever had in that State. The Rhode Island Greening, which was a fine apple in the East, I have produced in the Carpenteria at an altitude of but one hundred and seventy-three feet above the tide, where the water was not nearer than twenty-five feet to the surface, where I could grow strawberries in every month of the year, pronounced to be equal to Rhode Island Greenings of the Eastern States. Now, I say, while the varieties that we have here are few in number, the varieties happen to be of the very choicest kind, and we are fortunate indeed in this climate that we are able to produce apples at all. I say, the peculiarity of our climate is an anomaly; it is strange, it is surprising. Now, at our expositions here of our County Horticultural Society, which generally has its meeting in October, are shown apples as fine as I have ever seen from anywhere, and I won't except Central New York. And I think apples from one of the valleys in this county, Lompoc, took the premium at the State Fair.

FRUIT DRYING.

Essay by H. GOEPFER, Santa Ana.

To the State Board of Horticulture: Your worthy Secretary, Mr. Lelong, having requested me to prepare an essay on "Fruit Drying," I will comply, with some feelings of reluctance, for numerous reasons, the most urgent of which are: Only having two seasons' experience, there are many who are more competent for the task; and, second, age and infirmities having compelled me to retire from the business, I don't feel the enthusiasm in it as formerly. But if my little experience will be of any benefit to any person, they are welcome to all of it.

In the first place, I will give a brief description of my rustic smokehouse. It is a plain, square box, about six and one half feet high, and wide enough for sliding my trays lengthwise into it, and four inches deeper than the width of my trays. Standing on the bare ground, for obvious reasons it has no floor. On the sides are slats, just far enough apart to admit the trays easily. Mine takes in fourteen of them. The door is shut tight against the edges of the sides, with the battens on the outside. The trays are put in alternately, the first to reach the back, and the next the door to shut against, so as to cause the fumes in ascending to sweep over the sur-

face of all the trays. Now, I have to make some remarks as to the stage of ripeness of apricots and peaches.

In my first season's experience I found that the fruit, after it became soft, and in the best stage for eating fresh, when dried it would turn dark. The cause of which I learned since was, that I did not use enough sulphur, and last season I put the most of it in in that stage, and it turned out perfect in color and better in quality than when put in sooner. As they were put and nicely laid on the trays, I laid them in the sun until I had enough trays for filling my smokehouse. I then laid a piece of newspaper, about a foot square, on the bottom, and put a double handful of sulphur spread over it, set the edges on fire, shut the door, and left them in until I had another batch ready to go in. Then I took them out and exposed them to the sun. After sundown I would stack them and cover the top one with an empty tray.

To expedite the drying, I also used a home-made drier, which was simply two brick walls twelve feet long, with an arch in front and a chimney at the rear about eighteen inches higher than the front, inclining to the south; covered it with a frame six inches deep, with a sheet-iron bottom, three feet wide, and this bottom I covered two inches deep with fine gravel, for the trays to rest on and keep them from igniting, and covered the whole lot with two hung windows, such as are used for hotbeds. After my fruit was nearly sun-dried, I would finish it in the drier. I would build a small fire after sundown, keep it up till bedtime, and leave it with a heavy chunk of wood to last over night. After being dry enough so as it would rattle, I put it in boxes, and covered them up tight, to prevent the ingress of insects. The process with prunes is the same, except instead of pitting and sulphuring them I had a basket which fitted loosely into my washboiler, which I had half full of water with a little lye in it, over a brisk fire. Into this, when boiling, I dipped my prunes for about one minute, and after letting them drip a little I dipped them in a tubful of fresh water, and spread them on the trays.

MR. CADWELL: I have had some experience in drying fruit in this part of the country, in this county. Fruit drying here is mostly confined to evaporators, or fruit driers, as they are called. We do not have sufficient sunshine to dry fruit extensively, or to cure raisins here on the coast. We may dry a little in the sun, but if we have a great amount of it, we may have a few days of bright weather, and then you may get a day like we had this morning, so we can't dry fruit successfully in the sun. Those living in Fresno, and the interior counties, have a great advantage over us in that respect. If our driers are properly constructed we can dry fruit successfully and keep it. I have used driers of two or three kinds, and can see very little difference in the product of the drier. If a drier is used properly, one will make as good a product as another. We treat our fruit with sulphur, if it is overripe, particularly on apricots; if it is overripe, we treat it with a little sulphur smoke; we bleach it, similar to this man's way of doing, some burning it one way and some another, but the result is about the same, and then we put the fruit in our driers. I have a drier of my own construction, which does good work. It is modeled somewhat after the plan of the Burns drier, but is not like it. It does good work, and more of our fruit should be dried and properly cared for. After we dry our fruit we are troubled a great deal with the fruit moth, a fruit worm, some call it, but it originates from a nice little butterfly, or miller, flying about. One would think it was an innocent thing, but as sure as you leave a little place where a worm can get in, it will injure the fruit. We have

to guard very carefully against the fruit moth; the egg it deposits hatches in two days, and the result is our fruit is wormy before we are aware of it. All sun-dried fruit has to go through a heating process to kill the worm, or the miller, whatever it may be, in the fruit. It won't keep any length of time; you can't depend on any sun-dried fruit, and if our fruit remains in the drier when it is not hot enough or tight enough to keep the little miller away, you will have the miller from the drier. We are troubled wonderfully in that way, and have to be very careful; whether it is so all through the State I do not know. We take our fruit from the drier, if we can, before the drier is cool enough to allow the miller to pass through it, and put it in boxes, or barrels, or something tight, and cover it up tight to keep them away. If we can keep the millers out, the fruit will keep an indefinite time, I don't know how long. We make some very nice fruit, and more of it should be made, and there should be a combined effort to put this on the market. Of the dried fruit very little more than what is actually needed we can sell, and unless we can get paid for handling and drying it, we cannot do it. Drying is one half, and making a market is the other half, and it is very essential that we should understand both.

MR. KILLOM: Next to fruit pests, I consider this question of fruit drying the most important to the fruit men in California. Here in California we can't tell when it is going to rain. The best sign I have in custom is to look off to the northwest, and see the sign of rain, and presently the rain will come up from the southeast. We can't tell whether we are going to have a sunny fall, or whether the clouds will come over us and hide the sun, and hazard our efforts to dry fruit. I have seen, during my short residence in California, one season when one locality there was one hundred and fifty acres covered with grapes drying for raisins, and there was thousands and thousands of dollars at stake, depending entirely on the fogs, and the clouds came over it, and there was a great loss. And what was not rotted was carted and shipped off to the Mojave or Colorado desert, and there dried. Now we can't have everything in one country. I have heard a great deal about this place, and I had got the idea that everything was pretty near fertile. Santa Barbara was known years and years before I ever saw California. I have had a friend come down by the ocean and stay for her health, and it never occurred to me that there were any faults in Santa Barbara; true, I knew it was right on the seacoast, but I did not suppose the invalid would come two thousand miles to a place where there were any fogs. This is my first visit to Santa Barbara, and with the two days' experience we have had here, I would say the climate is very soft and very mild, but I find this same difficulty is encountered here in drying fruit by the sun. The sun always will come in, and reinforce us in our efforts to dry, but so long as we depend upon the sun in California to dry our fruit, we run a great hazard, and will incur, from year to year, great loss; hence, our fruit must be dried in some way by some of the driers that are invented that will be cheap, that will be simple, and will enable each farmer to dry his own fruit, using the sun when he can, and when the sun is obscured, using the drier. This is the important question, because the fruit is shipped East, and the more water we take out of it the less freight we have to pay.

MRS. PARKER: I have had some little experience in the past seventeen years drying fruit. The first year we had apples to dry; I worked very hard to dry them nicely, and was very proud of them; they came out very nice, and I took them down to the market and they offered me three cents a pound for them; that cured me of trying to dry apples. Then my son had a large quantity of apricots, and my husband built a large drier, and

my raisins that we put up received the first premium in Los Angeles, for the best raisins—that was in 1877. We have had a good deal of experience, and I find they all come to the conclusion in marketing fruit, that the plan of sulphuring, as Mr. Goepper, of Santa Ana, has asserted, is about the safest plan. It seems to keep the flies from them, but I cannot say that I would like to buy sulphured fruit for my own use, notwithstanding it may be equally good for them that like it, but I am not fond of sulphur. It is very disagreeable, but we have to prepare something to keep that miller away. I remember I dried, partly in the dryhouse and partly in the sun, some very nice peaches. I was proud of them, and put them in a box, and did not think but what if I kept them covered up that they were safe, and the commission merchant came to our house and asked me if I had some peaches; I told him that I had some that were very nice, and I went and I got them, and there was the worm. I was perfectly astonished, because when I put them there ten days before they were free from worms. He told me then something which I have remembered since. He asked me, "When do you put up your dried fruit?" and I told him when it was convenient; he said, "Put your dried fruit in the sun hereafter, and take it up when there is very warm sunshine; keep it covered up nights, and when you come to put it away for sale, take it up when the sun is broad, and clear and you will have no trouble if it is properly dried." So I tried that for three years, and I have dried peaches now in the house that are just as free from worms as they were the day I took them up, and I was very careful to take them up when the sun was shining very brightly.

MR. GREGG: This little miller, of course, is the dread of all fruit driers, and has been so for some time. Every one who dries fruit finds it out by more or less becoming wormy, but I have succeeded this last year in keeping the fruit entirely free from worms in a very simple manner, which I am going to continue—it is by the use of sulphur. Our warehouse is 35x50 feet, ceiled inside, with only four doors, which shut tight; and every Saturday night we burn about five pounds of sulphur. We have a kettle standing in the middle of the room, and we have sometimes several carloads of fruit in the building, and we fill this kettle about half full of dirt, and every Saturday night we burn about five pounds of sulphur, and shut the room up perfectly tight. Monday morning we throw open the doors without entering, for it would be almost death to the man that would go in at first; we throw open the doors and let the room air. In this way the millers have not affected the fruit at all, and it has even killed mice, and any millers, or moths, or worms that may be there are killed. As to sulphuring fruit for bleaching—it is not bleaching really, it is holding the color—I think it does not hurt the fruit a particle for eating; I would just as soon eat fruit sulphured properly as I would fruit which is not; in fact, I would rather do it, especially apples. Apple sauce made from the dried apples tastes much better if it is light than if it is dark, and I do not think you can taste the sulphur one particle, unless you put it into it. My plan, instead of getting the sulphur on coals, which I object to, is to take house lining, and tear it into strips about a foot wide, and dip it into melted sulphur, and hang it on one end; and when that side is dry, put the other end in. In using it you take a piece about eight inches square for sulphuring fourteen trays, which are in a tight box, and that will hold the color of the fruit as it ought to, but I defy any one to taste it. The trouble is burning on the coals, as a great many do, that the fumes from the charcoal help to taint the fruit, but it will not do it just using the house lining.

MR. CADWELL: I have seen fruit sulphured so much that you could detect the smell of sulphur in the fruit when it was cooked, but if it is prop-

erly done, you can't taste it. I think you are more likely to taste it in apples, perhaps, especially if they are overripe when put up. Apples are better to dry just as they commence to mellow—mellow apples have not got the flavor—then is the proper time to dry apples; it takes very little sulphur then to keep their color and flavor, and it makes the finest of evaporated fruit. I have injured some fruits by applying sulphur, that is the first of my experience, burning sulphur in the drier while the fruit was drying, bleaching only a little of it. I found that the fruit that was warm and partially dried retained some of the flavor of the sulphur; I soon learned that, and now I never allow any sulphur to go into my drier while the fruit is drying. I always like to have the fumes of the sulphur touch it fresh, and then put it in my drier—I don't want any sulphur in my drier. I don't, as it would affect the fruit when it was dried, properly cured, and put in boxes, but I should have my fears about it if there was much moisture in it, of putting the fumes of the sulphur so strong, I should be afraid it would taint it more or less.

MR. GRAY: When the fruit is dry it takes up no sulphur; there is no danger, you might burn twenty barrels, and as it is dried it does not affect it. It only takes up the fumes while it is green.

MR. C. M. OPDYKE: I have had some little experience in drying fruit. I have never used any sulphur because my wife told me not to, and after I got my fruit nicely dried, I took two sacks, one a common barley sack or flour sack and the other a paper sack, and put some in each; those in the paper sack came out just as good as they ever were; I never got any with a worm in it. Anybody that will try that, if they will put their fruit in paper sacks, they will have no difficulty with worms afterwards.

MR. R. C. KELLS, of Yuba City: I have had a great deal of experience, especially the last few years, in drying fruit in the northern part of this State. I have watched carefully, and made up my mind that the bleaching process was an advantage, especially in the outcome, and I did not see as it was any disadvantage to the fruit. I commenced bleaching last season, bleaching all my apricots and peaches, and got good prices; we have the sun for drying, and don't try to use any patent driers at all. It seemed to me in the beginning that sulphuring was an objection; but come to find out, in Georgia they have been bleaching peaches for over twenty years, and have good market for their fruit every season; consequently it proves to me that sulphuring is no damage to the fruit. As to keeping the worms from the fruit, I cannot say that it will keep the worms from the fruit, unless the fruit is taken up at a certain time in the day, the middle of the day, as the lady has spoken of; fruit taken up at that time of day, and put into a room where it can be spread four to six inches deep on the floor, and the windows and doors screened, so that the fruit can be properly stirred every day, and sometimes two or three times a day, the fruit will cure there, bright, soft, and pliable, so that it goes onto the market with a very nice appearance, and brings good prices. That has been my experience in sulphuring fruit the last two years, and especially this year. One of my neighbors had in the neighborhood of about six or seven tons of dried apricots and peaches this year, and had a large room 24x24, I think, and had the doors and windows screened; and at about the middle of the day he would take up his fruit and put it on this floor. He had long wooden shovels, or boards, shaped like a paddle, and he would go in there two or three times a day and stir it up so that the air would pass through; he had the windows raised so that there would be full circulation of air; and no flies could get in; and I bought this fruit, and paid very close attention to it as it went onto the market; I wanted to find out what price it would

bring. The consequence was it brought finer prices, it kept in better condition, was free from worms until it was sold at retail, and brought from 2 to 2½ cents a pound more than any fruit I bought this season. It went in better shape, did better, and looked better, than any fruit I ever saw. So far as I have learned, and from others who have paid close attention to it, take up the fruit in the middle of the day. I have never tried the process of taking up the fruit when it is two thirds dry, and finishing it in the room, but I think it is a good thing, and would be good for those who are drying fruit in the sun; if they have not time to finish it in the sun, to put it in a room when it is partially cured and finish it.

Another thing comes to my mind, as to the sulphur being an injury. You take a silver spoon or knife, or a steel spoon or knife, and leave it for forty-eight hours, and the sulphur in the fruit that has been cooked will not color the spoon as much as an egg will in an hour. And I was also informed by a practical physician, a man who is a thorough chemist, that that was the case—that he could testify to that from his experience—that fruit which had not been bleached over half an hour—that he had some fruit where it had been subjected to the sulphur for half an hour—and he tried it with steel and silver both, and it didn't color the spoon as much as an egg would in an hour.

MR. OPDYKE: I would ask the gentleman if seedlings are easier dried than grafted fruit?

MR. KELLS: I could not say as to that. I will say that fruit bleached will dry in two thirds the time that fruit that is not bleached will.

A DELEGATE: I would ask as to whether fruit dries better on the ground or raised off of the ground?

MR. KELLS: That is a question I put to Dr. Jarvis, of Riverside. He said that lying on the ground was the best, and my experience in drying raisins has taught me that that is correct. Your tray is lying on the ground during the day, the ground heats somewhat, and at nighttime they are lying on the ground, which retains the warmth, whilst being above the ground—six inches or a foot, whatever it may be—the cool air passing under naturally cools the fruit off, and it takes it one third of the day to get warm again, whilst, lying on the ground, the ground retains its warmth and the fruit continues drying.

MR. GREGG: In regard to dipping the French prune in brine, I very much prefer a light syrup. Take a light syrup of granulated sugar and water, it will kill all the eggs of the moths just as well, and then when you come to cook it you will have something that goes better with the French prune than brine, even if it is weak; and, besides, gives them a gloss that you cannot get with a brine. We put up quite a quantity of French prunes last year, and I defy any one to bring out anything that will look better than they do now. We dip them in this hot syrup and then press them right in the tin cans while they are hot. Speaking about the time fruit will dry in the sun, we dried apricots last year in two days and a half, and there are not very many driers will do better than that. You can do it in the Sacramento Valley, but not where you have fog.

MRS. PARKER: I would like to find out if there is any person that has experience in drying figs, and what that experience is?

MR. GRAY: We never have had any trouble to dry the common California black fig. We have not dried the Asiatic yet. By dipping them into a quite strong lye, and then rinsing them so that the lye cuts the skin, they will crack and look white in spots; then put them out in the sun and press them out. Do not let them lay too close together; you do not want to pile them up at all in the sun. I think the greatest trouble is in allowing them

to be out too long. Figs do not want to be dried so that they will rattle, they want to cure instead of dry, and they will cure in very much less time than one would think, although the moisture must be taken out. The only failure we have had was in drying the first crop. We failed entirely one year, took them up when we thought they were about right, but there seems to be more moisture, or a different moisture, in the first crop than the second. We usually have a light first crop, which we use up green or don't use them at all, and the second crop is generally dried without any trouble.

MR. HEATH: In my early efforts as a fruit raiser in this county, I found that fruit was going to accumulate on my hands, and I must find some means of saving the fruit. At that time I was not aware of the existence of any fruit drier in this State, and visited San Francisco, and could obtain no information at that time in regard to fruit driers. I wrote East, to acquaintances in New York State, and the information I obtained was very slight. All these patent driers that I have any knowledge of were not in existence then. On the coast here, we cannot dry in the sun, because in our brightest days in September, by three o'clock the moisture has appeared in our atmosphere so much that the fruit ceases to dry, and it is eleven o'clock in the morning before you can begin, although we are in almost perpetual sunshine.

My first experiment was crude. I started in a wooden building set upon a foundation of concrete, with a cellar eight feet deep; a series of driers above, the smoke having been taken up by a plate of iron above the fire and conducted into the chimney, leaving the heat to pass through the plate of iron and from the plate of iron up into the driers as I constructed them. Well, being ignorant on that subject, I commenced my fire in my oven; I had provided no draught of cold air above that iron plate; it did not occur to me that I must supply something to dry with, but I must have the fire and heat that plate; and I did heat it to the extent almost of melting a cast-iron plate half an inch thick. My fruit didn't dry; I was puzzled. I worked for several days and took a crowbar and went down, and above the plate of iron I knocked out two bricks so as to let in the cold air above the iron plate that was being heated by the fire, and took a handkerchief, for I wanted to see the effect of letting the cold air in. I held my handkerchief up, and presently the end of my handkerchief went in above the plate; then it was that I discovered that I must have a draught of cold air to heat to dry my fruit, and I immediately put a flue above that place. This little drier was small, only had a capacity of a dozen trays about three inches deep and about three feet square, because it was an experiment, and from that I decided to build a larger drier. I took out the bricks to the extent of a foot square and put the fire in my furnace, and the first thing I experimented with was the greenest fruit I ever dried, and that is figs. I must say that it was a perfect success. I used the little Naples fig, which I consider the choicest of the varieties of figs that we have for drying purposes in this State; the fruit is small, and when the stem commences to bend, I pick the fruit and set the figs on the trays with the blossom end up, because the sugar of the fig if placed with the blossom end down will, when heated, leave your fig and you will lose its flavor. In that way I succeeded in drying the fig to perfection, but in my experiment originally as it was, I burnt up my dryhouse because it was imperfectly constructed, and not being discouraged in that matter, I rebuilt that same building 18x33 feet, of brick. In that old drier I built a partition wall one half of the size of the original cellar, the whole size being about 16x33 feet. I cut that in two in the middle; I obtained a furnace, placing the furnace within the wall when it was constructed so that I could apply the wood from the

outside without opening the heated chamber inside, as my trays were designed to be opened above my heated furnace, separated from the colder air, there being two sections of the drier above the heated furnace inside. For instance, this would represent the cellar part [illustrating]; the furnace was in the center of the building, and the wood was admitted here without opening this door; the forepart being an air chamber for heating purposes. In the wall itself I pierced two holes of a foot in diameter, and made caps so that I would regulate the admission of the cold air by either putting on or taking off. Above that air chamber I arranged to have the drawers eighteen inches above the floor; in the floor itself were traps where the heated air would pass up from the air chamber below right up into a flue, and on the outside of the trays it was boarded with tongued and grooved lumber, so that no heat could escape in the drying of the fruit. The air passed up into the drawers and out through the flues made of tongued and grooved stuff, up into the ceiling above, so that in the heating process the heat passed through the entire trays, six in number, and passed out over the ceiling of the room above, which gave no heat in the working room of the drying house.

That worked pretty well as a second experiment, but I soon learned that there still was a defect. I speak of this matter, because it may be of interest to you if you build driers. I will give you a description of my present drier, which I consider as near perfection as any drier in the State. It is not patented, it is of my own getting up; I consider that I would do an injustice to the public of this State were I to patent an idea for the drying of fruit, so that you are perfectly at liberty to build a drier on this plan. This drier was a partial failure. I could dry apples (cut in quarters) in three hours; so far it was not a failure, but nevertheless, it was not successful, and I soon learned that that drier had to be changed. I then went to work, and wherever I saw a defect, I remedied it. The first defect I found was, that although I had air spaces below in my air chamber, there was no chance for the escape of the hot air nor the admission of cold air except through these apertures, which I left on purpose. The result as I then had it constructed was, that the supply of cold air into the air chamber in the cellar was not sufficiently large to supply the heated chamber to dry my fruit, and that I was receiving from the loft above a current through a part of the section of my drier; that the cold air was coming down instead of hot air rising as it ought to. I enlarged the apertures below, but never overcame that difficulty in my old drier, so when I commenced the drier I have at the present time (about the size of this building), with an air chamber the whole size of it, and furnace sufficient to heat a drier of that size, I resolved to try other experiments to remedy these defects, and instead of having each section by itself—there being one hundred drawers of a capacity of a half bushel each—and the sections are composed of four drawers high instead of six, the first drawer being about as high as would naturally be convenient for a man to stoop in taking out the drawer. Each section of the drier has its partition perfectly tight, as each section joins the other section. In the rear there is a partition, so that when I operate this section of drawers, it does not interfere with the section on the opposite side, because there is a division between the two, with a flue for the rear drawers, which I will explain as I go on. Instead of having the flues independent, I adopted this plan: on the top of my drier is a space fifteen inches wide and thirty inches high, and in the center of that space there is a partition running lengthways of the drier, being sixty feet long, and each one of the flues of the drier comes up into this open space and then passes to the center of the drier, where is the only flue for letting off steam from

the entire trays. By that means, if there were any cold air to come down that one flue, it would come down through the entire drier, and not to one section alone. Now, when the drier is full of fruit and the furnace going, I had apertures in the cellar below which had no connection with the inside of the furnace, because the flue in the drier below is the same size as the drier itself, so that I had a capacity of the whole size of my drier below the floor, to admit the cold air, consequently I could draw on that supply in any place for my drier, as each section is separate. I could use a section in this corner and a section in that corner, and draw upon the common stock of heated air, and I had no trouble in getting the heated air in any particular section, the drier being divided into sections.

I had experienced another difficulty in my old drier; that was the heated air coming in contact with the first drawer; the steam from that drawer of fruit must pass through the drawers above that before it could pass out. The Alden process is built on a plan that is exactly contrary to nature. That is a pretty broad assertion, because the Alden process is considered to be *par excellence* in this State, in that the fresh fruit is always put in the lowest tray, and as it dries it rises until you take your fruit out, generally in the second story. When you dry a garment of any kind you are not very apt to put it into water, because you must extract that before the garment can be dried. Now, in putting the fruit at the bottom, don't you see you are not getting rid of the steam of the fruit? It is the steam of the fruit that you want to evaporate in drying, and the steam must pass through every successive drawer until you get at the top, and to overcome that you must supply a sufficient degree of heat, as that is the only possible way you can get rid of it. Every time you put in a new tray you add new water to your fruit, and if the Alden process had commenced by putting the fruit on top and taking it out at the bottom, then I say it would have been according to nature. I put my fruit in only four trays deep; I would not add to the number of trays, for the lower tray is sufficiently high and sufficiently low to make it convenient for a person to take that tray out without too much labor, and the fourth tray is as high as he can work without getting up on some bench or stool. I also found that when the fruit in the lower drawer was comparatively dry, or drying, that the top drawer was scarcely heated; that, as a matter of course, I had to remedy, and instead of having my register, as it was the whole size of the drier, in the floor under each section—instead of having all the heat pass up under the first tray, I put a division half the size of my register under the third, and passed one half of the heat back of the first two drawers, or the lower drawers, and let the heat escape on top of the second drawer, so that I got one half of the fruit heated directly from the air-chamber below, and my third drawer got just as much heat as my lower drawer, and I could not discover, after I made that improvement, any difference in the temperature, because the additional steam that came from the first and second drawers was overcome by admitting one half of the heat from the register over the second drawer; and in that way I could regulate the heat; then I left sixteen inches between the top of the upper drawer and the top of my drier, and that took off the heat and steam from the fruit itself. Near the top over each section I placed a board, fastened to an iron hook that formed a damper, so that when I closed that damper over the section of fruit, I held the entire heat of that section upon the fruit itself, and there was no manner of escape for the heat or steam; and according to the amount of space I left at the end of my damper, I regulated the draught of the steam I had from those four flues. That is my present drier. In

that drier last year, in drying the entire crop of a large orchard, I used but twelve cords of wood for sixty days in succession.

A DELEGATE: How much fruit did you dry with that twelve cords of wood?

MR. HEATH: I dried seventy odd tons of walnuts; the amount of apples and other fruit I don't recollect; but I kept up to the capacity of my drier for the sixty days, and this year I am going to double the capacity by building another of the same size.

With regard to prunes something has been said; it is a very difficult fruit to dry. I take them after being dipped in lye, the usual way of softening the prune, and then washing it in cold water and leave it in the drier three hours; in that time the prune would become plump; the hot water itself would expand the prune to its utmost capacity, and little could be then gained, so that I adopted the plan of taking the fruit out and opening the doors in my dryhouse and allowing the current of cold air to come in through the trays, and drew out the trays, and exposed the fruit to the cold air; then in twenty minutes' time the prune itself would shrink, the steam would pass from the prune and it would shrivel; the pores of the skin would open, and when once shrunk it was prepared then to shut your doors and you commence your heating process for another two or three hours. In this way I tried four successive coolings of the fruit, and found that four successive coolings of the fruit added greatly to the evaporation of the water from the fruit, and in that way I obtained a perfect dried prune in twelve hours, which I consider a very reasonable time in drying thoroughly and curing prunes; and in drying and curing the prune I must call your attention to one fact; you must not be deceived in regard to this matter, because there are a great many conditions in drying various kinds of fruit. You dry your prunes dry, so that there is no mistake about your evaporating the water of the prune, because you must get rid of the water; then you pile your prunes in piles for four days, and in thirty-six hours you will find that although your prunes were brittle and dry, that the moisture has accumulated to such an extent that you begin to doubt really whether the prunes are dried or not. The fact is, that your prunes are undergoing a sweating process which must necessarily take place before you can pack those prunes with success. If you pack them without going through that sweating process you are liable to lose your fruit, but let them pass through that process for four days, and at the end of that time you will find that the moisture of your prunes is gone, and your fruit returns to its original state of dried prunes.

If you desire to pack them for the market, you take a few pounds of prunes and set out to make a syrup to pour over your prunes; that adds a luster, nothing more; it does not add anything to the value of your prunes; it simply makes them attractive to the sight, and enables you to sell your fruit in the market, because it is glossy like the French prune. You pour that over your fruit, you dry it sufficiently to dry the syrup, for your fruit is already dried, and the gloss is what you obtain; and if you put it in a box where no moth can enter, you have the French prune as pronounced in the city of New York, from my own experiment, equal to anything imported from France.

In regard to the moth I have this to say: that the moth exists if you sweat your fruit, or allow it to sweat before you pack; and if you pack in boxes tight, and first take the precaution to place a piece of paper an inch wide on the openings of the box on the ends and on the sides, you may be sure that you will keep that fruit for three years without any moth. That

is the process I tried, and sent the result to New York and had it examined by experts, and they pronounced it equal to any of the French prunes.

MR. KELLs: What is the size of your drier, the cost, and the length of time that it requires to dry prunes, or apricots, or peaches?

MR. HEATH: The cost of that drier may be made according to the fancy of the builder. My own drier is built rather after an expensive style, but there is no reason why a small drier on this same plan cannot be built within the means of any fruit grower, although he may not have an orchard of over five acres. You can put your chamber in the earth, and can build of rough boards if you like. You gentlemen are going to Mr. Cooper's place, and his drier is patterned after mine, excepting this thing: that is a cheap drier, and can be made of any size, to cost from \$50 to as much more as you like. He has built his so that the outside of the drier is exposed to the air, which saves the expense of making a building to inclose your drier. I do not approve of that plan, because in opening your fruit you expose it to the cold air, and you lose too much heat from your furnace below. If it is in a house you can close your doors and prevent a draught of cold air; so that you may have your drier of one section of four drawers; it would not cost you \$25, with a common box-stove, which costs you \$12. The heat from my furnace is conducted through pipes eight inches in diameter, of No. 14 iron, so that I get the heat of the entire furnace below; of course my furnace is in the center, and my chimney is at that end; the pipe commences out over yonder and comes to this part of my drier, passes around until it comes to the other side, and my eight-inch pipe continues until it reaches the further end of the building, and there passes into the chimney; and when I have my drier up to a heat of 150 degrees, I can put my hand upon the pipe where it passes into the chimney, and see that it loses no heat. That is one of the requisites in drying fruit—that it is not made at too much expense.

MR. CADWELL: I have a drier somewhat similar to that of Mr. Heath. The air chamber is eight feet wide, four feet and a half high, and sixteen feet long; it is in three sections over this air chamber, with an opening of seventeen inches square, letting the hot air into the sections; my trays are three feet square, and sometimes I have eight, ten, and twelve trays, one above the other; that is about enough. I fill my drier from the outside; I prefer it; I like to work in the open air. I have three trays to each door, and open a door and put in my trays from the outside, and the section being four inches longer than the trays, I begin at the top and put in the first tray flush clear back to the back side of the section; the next tray comes forward so that the door closes against it, and so on, to leave a space between the trays where the heat passes back and forth. I have the flues closed through all the sections that are not in use, so that I can use one or more sections as I please. I fill my section; I don't wish to fill it rapidly, but fill the sections, and when I get the sections full the fruit is beginning to cure well on the surface, and then I shut off some of the heat; of course it is warm at the bottom; I shut off some of the heat and go to work at another section. My drier works well; we have no complaint to make; it is handy to use. It is higher than the drier last spoken of; we have to go to work a little lower to put our trays in, and as we go a little higher we must have capacity, and to go over so much surface increases the cost very much. We can dry ten trays in our section very well, and we do not have to reach too high, for it is so I can get my hands on the fruit, and can always tell how the fruit is doing, and can regulate the heat by my hand; still, if we could dry our fruit as they do in Fresno, we had a great deal rather do it.

MR. GRAY: We put up a few pounds of glazed fruit this season. I don't know whether it was done in the manner that they put it up for market, but running a cannery in connection with the orchard, I experimented with a few pounds. I made a fruit which is very good to eat indeed, although it does not compare with some others in appearance. We simply processed it in the cannery in a very heavy syrup, just as heavy as you can dissolve sugar in water. It was allowed to stand about a week in this syrup, when it was taken out and drained, and then put into the drier on wooden slats; it would not do to put it on iron and dried; and when it is taken out of the drier, granulated sugar is sprinkled over it, so that it would not stick together. Then after it had become cold, we put it into an oven on trays, just enough to melt the granulated sugar so that it kind of makes a glistening coat over the fruit, and then I think the proper way would be to take a very little pulverized sugar and put over it. The longer it is kept the better it is. At first it is rather tough, but if it stands for three or four months, the sugar in the fruit granulates, and it will become rather brittle. I know it is good to eat, but whether it is anything that would find a ready market or not, I am unable to say. We do not make enough to sell. I have got a few samples I am keeping to see how it works with age. We tried some peaches, apricots, and pears; the pears were rather tough, and did not succeed as well as the peaches. The best we made were from the orange cling peaches; they were very nice.

A DELEGATE: You cooked the fruit in the syrup and let it remain in the syrup after cooking?

MR. GRAY: Yes, sir; that is to let it take up as much of the sugar as it possibly could hold.

MR. SALLE: I want to state that the process is one which is very little known as yet among the people of California, and I do not think that those who are engaged in the business are very free to give information about the process, and it is probably also true that the fruit cannot be handled successfully by the individual grower. The plant is expensive and the methods are difficult, therefore the fruit should be handled in large quantities in order to make it pay well.

I think that that is one thing that the growers of fruit in California should look to—some method of handling the fruit themselves. And while I am on the floor, I would like to say in connection with fruit drying, that in Santa Ana Valley and other valleys in Los Angeles County, many fruit raisers have their trays for drying fruit put away in the shed, and they have a little plat of ground upon which they spread them when they are drying, and they have also a little row of stakes or wires stretched on each side of the plat of ground, upon which one tier of trays is put, and the wire is stretched over the second, supported by posts to hold the cloth with which they cover the fruit at night. The cloth is strung on these wires with rings, and in the morning it is drawn back to one end, or the both ends from the center, and the fruit receives the sun. At night the cloth is pulled along the wires, stretched over the fruit to protect them from the fog, and in case of rain they are protected also. When the fruit is nearly dry (as was stated in the essay), they are finished in the drier as usual. The grapes are dried in this manner, and when they are nearly dry, in some cases, they are carried to a large drier and finished. The packing of the fruit is not done generally by the individual driers, especially the grapes. They are sold in what they call sweat-boxes, to the packing houses, or to the men who carry on the business of packing fruit; but it is a very mistaken idea for individual fruit raisers to depend upon the large companies or driers to do the work for them in the way of drying and canning fruits. I think that every

individual fruit raiser should have it in his mind to take care of his own fruit in some way or other. With this system of trays they begin in the spring or in the early summer to dry the apricot, and next they dry their peaches, next the prunes, and last their raisins; so that the farmer can be kept all summer long on his proper fruit, if he has got it diversified as to varieties.

The Convention here adjourned until the following morning at half-past nine o'clock.

THIRD DAY'S PROCEEDINGS.

SANTA BARBARA, April 11, 1888.

The Convention reassembled, pursuant to adjournment. President COOPER, in the chair, announced the subject of the morning: "Citrus Fruits, Everything Pertaining to Citrus Culture, and the Disposition and Sale of Fruit."

PROPAGATION OF ORANGE TREES.

Essay by M. BALDRIDGE, Azusa.

Some time ago your Secretary informed me that I had been selected to prepare for this occasion an essay, "How to Propagate Orange Trees," and in order to achieve brevity in doing so, I shall present such facts only as have come to my knowledge. Do not expect me to cover the ground as fully as might be desired. I have been in the business only five or six years, and have only learned just enough to enable me to realize how little I know about it. Besides, it could not be done in such a paper as could be read before this meeting. I shall not consume your time with theories or references to text-books or consular reports. You can get what there is in them at home, and at your leisure. Neither shall I attempt a formula, and insist that it apply to all places and conditions alike. I propose to treat the subject in a very plain, practical way, and if I repeat much of what I have said at various times before our county society, it will be because my results have been so satisfactory that I would not change my methods.

The propagation of orange trees necessarily involves the conditions requisite to make a success. As this is the foundation upon which we propose to build, great care should be taken to make no mistake here. It takes too long to correct it. It is a well known fact that certain vintages will give a flavor and bouquet so much superior to other localities that money will hardly buy them. Certain localities only will give the most delicate aroma in tobacco, tea, and coffee. Many of you are, no doubt, aware that the nurseries near Geneva, in central New York, sell trees to all parts of the East. There is reason for it. The conditions there furnish the material to make a better tree than those grown in most other localities.

Now, when you begin to make your programme for propagating orange trees, the first thing to be considered is the selection of such a place for your seed-bed as will combine all the elements necessary to give a strong and healthy plant. Time and money would be well expended in visiting many places, and noting where the best trees are grown, and the conditions obtaining there. In this way you get a practical working test, which is better than an analysis of soils. I would select a rich chocolate marl

and fine sand, with just a little reddish clay in it; not so much that it would get stiff with irrigation. This will give you an abundance of fine, fibrous roots. If you plant in heavier land you will get a heavier tap-root, with so few fibers that the tree will suffer severely in transplanting. Plow deep, and pulverize well. A light dressing of ashes well mixed will discourage the worms, which are sometimes troublesome. Lay off the grounds, and make beds say fourteen by forty-two feet, with narrow walks all around them. Use the spirit-level, so that water will stand the same depth on every part. Put up earth from four to five inches high on the borders.

We are now ready for the seed. In man we recognize such a thing as inherent constitutional vitality, or "life principle." In animals we propagate with reference to it. The same thing obtains in the tree family. So far as my own experience and observation go, I am satisfied that stock grown from Tahiti seed will inherit this life principle in larger measure than that produced from any other source. A very large proportion of the trees in market are raised from "California windfalls," because they cost nothing. They are raised to sell, and only an expert can tell the difference. As to the "sour stock," which propagates itself in Florida, and is being used here to some extent, some years will be required to determine definitely its value. All that has been planted in this locality has a rather pale, yellowish color which I do not like. I very much prefer the deep, dark green, as indicative of a stronger life. All other "sour stock" has been fully tested and rejected. Lemon and lime promised well for a time, as the continual flow of sap would push a bud faster than the orange, but latterly the verdict against them has been unanimous. While I would not discourage experiment in any direction, I would rely upon stock grown from Tahiti seed until better results have been fully established for something else.

TO OBTAIN THE SEED,

Go to any importing fruit house and ascertain when they will have a cargo of oranges from Tahiti. Many of them will be decayed. Have a man there to select the largest, pack them in barrels and ship them in pulp. When they come to hand, wash out and plant. Do not permit them to dry. Cover nicely, say one half to three quarters of an inch. Now, cover the whole bed with clean sand one inch, as you cannot cultivate and must irrigate while in the seed-bed. This will keep the weeds from starting and the ground from baking. A barrel should give fifteen hundred to two thousand plants. Now put up posts and stretch bale-rope to represent ridge-pole and plates. Cover with very thin cotton cloth. This will protect the young plants from the sun and permit free circulation of air underneath. Irrigate always before the plants begin to show that they need it.

The month of May is a good time to plant. At about the same time next year transplant the nursery.

Have the ground thoroughly irrigated and well prepared. Plant far enough apart for convenience in cultivating, and a foot apart in the row. Bear in mind that you must have sand and marl with but little clay to furnish the mass of fibers you will need when transplanting to orchard. When growth conditions are well defined, put up a tent to protect fibers from sun and wind while handling. Make a box with one open side, face that side north, take up about a hundred and carry to the tent and assort into first, second, and third, and grout and heel in until the planters come for them. Let them take in a similar box about the same number. Plant with dibble, taking care to close solid around plant at bottom. Handled

in this way, all should live. They should not even lose their foliage, and the growth which has just started should come on pretty much the same as if they had remained in seed-bed. Now, irrigate just enough to furnish requisite moisture, and cultivate so thoroughly that weeds will have no chance to start. Do no pruning except to keep the way open for horse and cultivator for eighteen months.

BUDDING.

If trees have made a strong, thrifty growth, I would set buds in the fall. In my locality I can generally get buds and trees in condition in October. Buds should be cut from vigorous, healthy, bearing trees only. Sometimes several buds should be rejected from the heavy end of a stick, because imperfectly developed, and on tip end they will be too sharp and thin. I prefer to set buds in the fall, as they are then well developed and ready for the February growth.

The most important feature in the budding is the tying. I would just touch with wax after slipping in the bud, before putting on the string. Then be sure the top is well secured. I have often seen buds loose at the bottom, living, while all I ever saw loose at top were dead. I prefer to let the strings crease the bark pretty well before taking them off. As growth conditions come on I cut off the tree about four or five inches above the bud, and cover with wax to keep the wood alive until it is all healed in. When the bud is large enough to carry all the sap, select a period of non-growth and stump off to a shoulder with the bud, and again cover with wax. This cut I would make with a saw, and as nearly level as may be.

Ground should be kept loose in the tree row, otherwise klinker or scoria will form on the bark and originate "gum disease." If this should occur you may save the tree by scraping thoroughly to sound wood.

The method here outlined has given me Washington Navel buds, ten feet high at one year, and with good body and well branched, with a tree taper like a carriage whip, carrying white wood, and rounding cane well to top. Such a bud, with very large leaves and dark green, wax-like surface, furnishes the most conclusive evidence that conditions were good and methods correct.

I use no fertilizer in seed-bed or nursery. The nurseryman or orchardist can well afford some time and money in quest of such trees, or the locality which will in its normal condition produce them. The next business in order is—

TRANSPLANTING TO ORCHARD.

Here, again, conditions must govern. I prefer to do this at one year also, because there is much less top to cut away than at two years old. The second year's growth on such a bottom is enormous, is inclined to mature wood and put on fruit, and has to be cut away if left in nursery, when, if removed to orchard, such growth as is wanted can be forming the permanent top, and the rest can be thumb-pruned away without shock or check to the plant. As trees are to be taken from the nursery in spring, I strip the cane pretty close in early winter, then tip with wax every raw place. It is then healed over, the tree re-covered, and there is not much to do when planting time comes but to cut off so much of the top as would come above your six-foot stake. My trees carry this height nicely from nursery to orchard with stake for support. The first business the cane does will be to clothe itself from the bottom up, and you have a tree at once. I like this method for another reason. The first growth is strongly inclined to be lat-

eral, with a downward tendency. If that is taken off, the next growth will be nearly at an angle of forty-five degrees, and the tree can be readily shaped to carry a heavy load of fruit. This method I consider a very important feature in the foundation of a tree, and never having seen it adopted or suggested in any of the books, I claim it as an original discovery, and solicit investigation. Five thousand such trees planted in my own orchard two years ago will verify what I claim for it.

As to the proper time to transplant, again consult conditions and be governed by them. Seasons vary very much, and it is not safe to name the day, week, or month. When the buds are swollen to bursting, and new growth just starting, that is the time to take the tree from nursery to orchard. If there would be danger from subsequent frost, wait until such conditions are again on, when this growth has hardened. In my locality I very much prefer planting in February. Trees are then well established before the hot weather comes on. I finished transplanting the twenty-fifth of February, and the young growth just starting came on about the same as if trees had remained in nursery. When you find the tree in proper condition, cut it back, and cut the tap-root to hold it there. See that ground is well prepared. Lay it off and secure your force. I would plant budded trees twenty-four feet apart each way; seedlings, thirty. Have everything in readiness before you touch a tree. If a norther should come on just as you are ready, stop and wait until it is over. When weather is favorable, put some of your men to raising trees, some to digging holes, and some to hauling. Cover with wet blankets as soon as out of the ground. If sun is shining hot, or you have far to haul them, I would grout them; but there is so much danger that the grout may be permitted to dry or harden on the fibrous roots, that I would almost be willing to say, dispense with it entirely. I have never yet sacked a single tree, and latterly I have not grouted. I have made a success in packing to haul four miles without it. Sacking necessitates more root-pruning than I am willing to do. If land is deep marl and sand, as it should be, cut tap-roots twenty-four inches, dig holes thirty inches, and set crown-roots six inches below dry earth. I insist upon more tamping than most men are willing to do, but my trees live and do well. I ride no hobbies. I will adopt another man's methods when I see that he gets better results than I do. If a little space is left open anywhere on the tap-root, or the ground is left so loose that the first irrigation will open one, the bark will rot there and all below it is lost. I have two tampers and one shoveler to each setting-board, and dirt is filled in no faster than it can be made solid. I never plant orange trees to get done, never leave a tree until the work is well done. One tamp stick should be quite small to work among the roots. Tamp the bottom solid up to the crown-roots, then cover them and let one man tamp with his feet. A tank-wagon should follow the setters, and give each tree a bucket of water. As soon as the water has disappeared, cover up with loose earth. Now the tree has what is indispensable—something to preserve the old life until the new life begins. One bucket of water at this time is worth more than a flood a few days after. Your citrus tree cannot wait until you have finished the plot.

Now stake the tree and tie it, otherwise the wind will move it back and forth, packing the earth on either side, until a little space is opened around the cane where the air can penetrate to the crown-roots and evaporate the moisture. Put a little straw, half composted, on top, before the hole has been quite filled; put a little earth on it to keep the wind from blowing it away. Now paper the trunk; it keeps the jack-rabbits from eating it, prevents young growth from starting where it is not wanted, and protects the

bark from the reflection of the sand; otherwise the south side will be hide-bound. Try it with your knife; it will not slip, and you will find free circulation of sap on the north side only. You must protect the trunk from the ground up, until the foliage will do it. Now the work is done. Ninety-five per cent of the trees will live, and make a growth at first growth period after they are established in their new home.

PRUNING CITRUS TREES.

Essay by J. W. SALLE, Pomona.

In the matter of pruning trees, as in all other matters of horticulture, there are fundamental principles of nature underlying all methods, and the nearer the method corresponds with the fundamental principles the better the method. Then, the first thing to learn in pruning any kind of a tree is to know the nature of the growth of the tree, and the second thing to know is the object for which you prune.

The orange tree is a native of a tropical country, with abundant rainfall. The foliage is very dense, thoroughly protecting the body of the tree and ground beneath the branches from the sun's rays; hence the roots grow near the surface of the ground. It is, therefore, a great wrong to expose the tree trunk or ground around the same to the scorching rays of a noon-day sun.

To secure a good stock to begin with, the seedling should be four years old before the bud is inserted. The seedling stock should be well cultivated, irrigated, and manured, so the growth is vigorous. No pruning should be done to the seedling stock, for the growth of both top and root depends upon the healthy condition of both, and the more abundant the foliage the better. If it grows scraggy, let it grow.

If a seedling tree is desired, cut the top and branches from the seedling stock the winter after the fourth year's growth; allow but one bud to grow the following season. This will grow six or eight feet high, straight, and beautiful. Transplant the following season—*i. e.*, when the root is five years old.

If a budded tree is desired, bud into the best portion of the seedling stock the fall after the fourth year's growth, and cut all the seedling stock away to within six inches of the bud. Allow no other bud to grow, save the one inserted, and in one season this will grow five or seven feet high. Transplant when this bud is one year old. Drive a stake by the tree, and tie the tree to the stake: that is, if the tree is crooked, or too slim to support itself erect. The same instructions for pruning apply to both seedling and budded trees. We have now a beautiful, tall, straight stock to build a tree upon. This straight stock is very important, for without it we cannot make a handsome and symmetrical tree.

If the bud is put into a seedling stock only two or three years old, we will not get a handsome stock to build a tree upon; it will be low and scrubby, and is difficult to prune properly. But in any case, observe the following

RULES FOR PRUNING YOUNG TREES.

Allow all the branches to grow unmolested for three years, at least. Do not pull off the buds which come from the tree above the point of union of bud and stock. Below this the suckers should be removed. The better way, however, is to wrap paper around the tree from the ground up about

eight inches. Do this when the tree is first set in orchard. This prevents the suckers and unnecessary buds from growing, and also protects the tree trunk from the sun, and from gophers and rabbits.

If you desire your trees to form a head about three or four feet high, which, however, I do not recommend, you should not pull or break off the young shoots, which will grow thick all along the tree trunk from the paper to the top of the young tree, but allow them to grow until the foliage thoroughly protects the body of tree; say let these branches grow to be about two feet long, then cut off the ends of the low branches, and cut repeatedly as they grow; but at no time cut them away so the body of the tree is exposed to sun. Remember, too, that the more foliage you have on the tree the better will be the growth. If you want to spoil and dwarf your tree, just keep these low branches trimmed off to the height you want the top or head of the tree. Your tree will not grow at all, or but little, for several years, and while your neighbor, who allowed his trees to have their free will in growing, has been getting profits from his orchard, you will still be trying to *make* your trees grow as nature never intended them to grow.

I much prefer the branches to put out near the ground, say about eight inches above, and from that height to the top of the tree the branches should put out at regular intervals from the trunk. The lowest branches will droop to the ground the first season. They will be the first branches to bear fruit, and will bear two or three crops before nature is through with them. These low branches will not grow much after the second or third year, but the growth will be upon branches higher, which, like the first, will droop and overshadow the lower, or first branches. This will be about the third year; then is the time to begin the use of the shears.

Cut away such branches from the bottom and inside of the tree-top as nature seems to be through with, and which do not appear to be vigorous, and are useless in affording either fruit or protection to the tree. It will not require an expert to discover which they are. But in no case cut away a vigorous branch just to make the tree look pretty or to make the top high enough to plow under.

As the tree grows older, the same instructions should be observed. As the tree grows taller and larger, and the towering branches overshadow and dwarf the lower ones, and as these lower ones cease to bear fruit, they may be thinned out. Take a principal branch, for instance, and follow it outward from the trunk, and you will find many small laterals which nature seems trying to choke to death. These are the first members of this principal branch, and in their time bore the fruit and foliage, but now have been superseded by larger and more vigorous ones, and these old ones should now be cut away; but at no time thin the body of foliage so that an open window is left that the sun may shine through upon the inner branches or trunk of the tree.

The tree, when well trimmed, if ten or twelve years old, should present the appearance of an umbrella. The inside branches and trunk of tree, clean and smooth, with a dense foliage on extremities, and the top should come within three or four feet of the ground. But to let the top at all times rest upon the ground is a better way to secure a large amount of fruit, and then, too, no props are necessary, as each branch touches and rests upon the lower one, and the lowest rests upon the ground. In this case the ground never becomes foul or hard under the tree. I like this method best. However, the inside trimming should be done as above described.

Never should there be pruning done known as "heading in," unless it is with lemons. This method is sometimes necessary with lemon trees, as

they grow much more rapidly and branch longer than orange trees do, and in order to have them grow stronger, we sometimes "head them in." The same general instructions apply to lemon trees as to orange trees. Remember at all times to be sparing with the shears.

You are sure to dwarf the young trees by too much pruning. If you expose the trunk of a young citrus tree to the sun, the first thing nature will do is to attempt to cover it again, and as often as you remove this covering you injure the tree. And so, likewise, when you thin the top of the old tree to excess.

The advantages of low pruning are these:

First—The growth is much more vigorous and healthy.

Second—The tree will bear much earlier and more fruit.

Third—The fruit is much more easily and cheaply gathered.

Fourth—The tree is better balanced and grows straighter.

Fifth—The pruning is more easily and cheaply done.

Sixth—The wind will have less effect on both tree and fruit.

Seventh—The body of the tree is protected from sun and kept free from disease.

Eighth—The ground beneath and around the tree is protected from sun and not so apt to form hardpan in cultivation.

Finally, it is nature's plan, and you cannot depart from it without injury or loss.

CITRUS FRUITS—PROFITABLE VARIETIES.

Essay by A. SCOTT CHAPMAN, San Gabriel.

In this matter we must take into consideration the hardiness of the trees in their capacity to resist drought, frost, and insects, and the value of the fruit when grown.

Of all the citrus trees the seedling—that is, a tree grown from the seed of a sweet orange—is considered to be the best to resist drought, frost, and insects, by reason of its hardiness. It grows to larger proportions than the budded varieties, and bears more oranges to the tree, but the fruit of the same will not sell for prices that the fine budded varieties command.

On account of the hardiness of the seedling orange tree, it is preferred for budding upon.

The Washington Navel is the finest of all the budded varieties, and sells for more money, but the tree does not grow and is only a good bearer under the most propitious circumstances, and the fruit is very susceptible to frost.

The Maltese Blood is a more hardy fruit; the tree a more generous bearer. Like the Navel, it is seedless, but has a peculiar flavor of its own.

Azorian St. Michael.—A tree imported from River's Nurseries, in England. Is a large tree, a heavy bearer, and the fruit has the most excellent keeping qualities.

I append hereto, from advance sheets of a treatise on citrus culture, by B. M. Lelong, our Secretary, the following, bearing on the variety:

Valencia Late.—"This variety has, in the last six years, fruited in this State, and is one of the best varieties grown. The fruit resembles the *Paper-Rind St. Michael* in color and firmness, but oblong, being double in size. Trees of this variety do not commence to bear young. So much in its favor, as most of budded varieties commence to bear when entirely too young, thus checking the growth of the tree. It is a very good keeper and a prolific bearer."

Mediterranean Sweet.—"Fruit medium to large; pulp and skin of fine

texture, very solid and few seeds; ripens late. The tree is thornless and of a dwarf habit of growth."

The Paper-Rind St. Michael.—Is a most excellent fruit, somewhat small, of thin skin, juicy, and very sweet.

I consider the *Lisbon and Eureka Lemon* the most profitable to be grown.

THE FUTURE OF CITRUS CULTURE IN CALIFORNIA.

Essay by L. M. HOLT, Riverside.

To the President of the State Fruit Growers Convention: I regret my inability to attend the Convention of Fruit Growers at Santa Barbara, but my business interests are of such a nature that it is entirely impossible for me to do so. I intended to be there, and to respond as well as I could to the invitation of the State Board of Horticulture to discuss the question of "The Future of Citrus Culture in California," and to participate in the debate on that question, but matters of a private nature are such that I cannot attend, and they have kept me so busy that I have not had the time to prepare a paper on this subject that would do the question justice.

I desire, however, to call your attention to a few ideas, in a brief manner, for your consideration. The question of where the orange can be grown, is one that has attracted the attention of the fruit growers of California, to a great extent, during the past few months, and this question is intimately connected with the future of citrus culture in the State. There is one idea, I think, that has been entirely overlooked by the public discussions of this question, and that is, that more attention has been paid to the subject of where the orange tree can be grown, than to where the orange fruit can be raised.

California is subject to cold waves during the winter time. There is practically no portion of the State that is free from the cold wave. The question of average temperature cuts but little figure in orange culture, only as the question of minimum temperature is satisfactory. A cold wave that will destroy the crop, will not materially injure the tree; therefore, that locality where the tree can be successfully grown might have such a minimum temperature that the orchard would never fruit in a profitable manner. A cold wave that would do no damage to the tree, and no damage to the fruit, in January, might ruin the crop if the same temperature should come in November, before the orange is sufficiently matured to resist the cold.

In November, 1886, a cold wave swept over Riverside, which sent the thermometer down to 27°, a point which would only cut back the tender shoots of the tree, and practically, it would not injure the tree at all; and yet, the fruit in its immature state at that time was seriously affected. Of course, the mercury in different localities registered a different degree, but at that time there was probably no orange in the valley that was subjected to a lower temperature than 25°.

During the past winter, in January, the celebrated cold wave, which swept all over the State, put the mercury down to 25° in Riverside, two degrees colder than the cold wave of 1886, and yet no damage was done, because the condition of the tree and fruit was such as to withstand the cold better in January than in November.

In neither one of these cold waves was there any damage done to the orchard. In fact, the mercury could have gone several degrees lower than

it did, and yet the trees would have sustained no injury of a permanent character.

The question, therefore, for the practical fruit grower to study is, to find the locality for the planting of the orange, where the minimum temperature will be high enough to save the fruit as well as the tree.

There are a few propositions of a general character which are now recognized in connection with citrus fruit culture in California. One is, that the best localities for perfecting the orange and lemon are located away from the coast, in the interior valleys of the State. Wherever the orange has been grown, from Oroville to the Mexican line, every bearing tree, wherever located, has been a witness to testify to the correctness of this proposition. As a rule, all orchards located along the coast have been attacked by the common black scale, accompanied with the black smut or fungus growth, and every orchard located in an interior valley, as a rule, has been free from both. The one invariably accompanies the other, the black smut being the result of the black scale.

The same rule does not hold true as regards some other insect pests. The red scale and the cottony cushion scale are to be found in some central portions of California where the brown or black scale do not exist, although in Southern California it has been confined thus far to the coast valleys.

The markets of the United States demonstrate the fact that the oranges raised in the central valleys command higher prices than those raised along the coast. These interior oranges command a higher price in Chicago than any oranges shipped to that market from any portion of the world. It was these oranges, grown in the interior valleys, that competed successfully with the Florida, and secured the gold medals for the best twenty varieties grown in California, in the United States, or in the world. In making this statement, I do not wish to reflect in the least upon the magnificent display of oranges from San Diego County at the New Orleans World's Fair. It is a well known fact that the line which separates the interior valleys from the coast valleys, so far as citrus fruits are concerned, nears the coast as we progress southward towards the Mexican line, and that only a few miles back from the ocean, in San Diego County, we find as clean fruit as we do further north, twice or three times that distance. It is also true that on the very coast, in San Diego County, clean orchards can be grown for many years, although eventually the scale, as a rule, gets possession of the trees. Hence, we find around the bay of San Diego very fine oranges grown on young trees. This does not conflict with the general rule which places the home of the orange, in California, away from the coast.

The time is coming when trainloads of oranges from California will be shipped across the Rocky Mountains, where now only carloads are sent. It is only about three years since oranges were first successfully shipped from Southern California to Chicago. It was then an experiment; a market had to be made in the Western States. It took time to make it, and yet the market has extended more rapidly than did the bearing capacity of our orchards; and there has never been a time, since the shipment of oranges on a large scale to the Western States commenced, when the demand for good oranges did not exceed the supply. And yet the markets of the northwest are only partially developed, and the east has not been touched at all.

We do not come in conflict with Florida in the orange markets of the north, because the Florida crop is marketed before the California crop is ready to market. Our shipments commence about the first of February, and at that time theirs is practically ended. The Florida crop of oranges

comes into market about the first of November, and continues for four months. The California crop commences about the first of February, and continues about four months. Florida has the disadvantage of placing its fruit on the market during the four coldest months, at a time when the public do not appreciate acid fruits. The California crop comes upon the market in the spring, when the system demands an acid fruit, and at a time when there is practically no other fruit in the market with which it is brought into competition.

It is for this reason, and for another reason of actual superiority, that the California orange commands from \$1 to \$2 per box more in the market than is paid for the Florida orange.

As yet, the supply of the California orange is not equal to the demand, and the supply is not increasing as rapidly as the public generally think. Orange orchard planting has practically ceased for several years past along the coast valleys of Southern California, while it has received an impetus in the interior valleys during the past four or five years. There has been practically no increase of production of oranges in the coast valleys, and it is doubtful if there ever will be an increase in those sections. Hence, we must look to the interior valleys for the orange supply of the future. This supply, at present, comes from a limited area, and the future increase of oranges from those valleys will be slow, because it requires so many years to plant the orchard and bring it into bearing. Riverside illustrates this point very nicely, as is seen from the shipments from that valley during the past four seasons.

During the season of 1884-5, the shipment of oranges from Riverside amounted to about five hundred carloads. During the season of 1885-6, the shipments were about the same. During the season of 1886-7, the shipments did not reach five hundred carloads. During the present season, 1887-8, the shipments to date have reached nearly five hundred carloads, with probably two hundred or three hundred carloads yet to go forward.

The total shipments of oranges from Southern California are not a great deal larger to-day than they were four years ago, and yet, while the increase is slow, it is certain, and in the four years to come we may look for a larger increase than in the four years past, because more young orchards will come into bearing.

The question of raising a superior orange in California is now settled. This State not only raises a superior orange, an orange that is king among oranges, but that fact is recognized by the markets of the United States, and there is no probability that the present century will see enough oranges produced in California to supply the spring markets of the Atlantic States. The Mediterranean orange is being practically driven from the market, while the Florida orange cuts no figure, as it is not a competitor.

Our people are learning rapidly where choice oranges can be raised successfully. Fortunes have been lost in learning this lesson, and other fortunes will probably be also lost in trying to demonstrate the fact that the California citrus belt is a large one. A few will pay heavy tuition to learn these facts, and the masses will take advantage of the facts thus learned.

Cultivation of the orange in favorable localities is probably the most profitable business to which an acre of ground can be devoted for horticultural or agricultural purposes. It takes time to develop an orange grove, and this fact, taken in connection with the fear of over-production, keeps the masses from going into the industry, and hence the time when over-production will come, if ever, is pushed far into the future.

The price of choice orange land in California is yet very low, as compared to the price it must attain when this industry and the markets

become fully and thoroughly established. Riverside to-day has three thousand acres of orange groves, which will produce next year one thousand carloads of oranges—an average of a carload to every three acres; and this crop will increase from year to year, until an average crop of two carloads to the acre is reached, or six thousand carloads from the three thousand acres. The crop of these three thousand acres next year will pay \$200,000 in freight, an average of \$66 to the acre; and when the trees are in what may be called full bearing, they will pay freight at the rate of \$600 an acre if the freight rates continue as they are to-day—\$200 a carload—while the average net income of the crop now is \$200 an acre; and similar markets which have prevailed here for the last three years will pay, when the trees come into full bearing, six times that amount, or an average of \$1,200 an acre, this being reckoned as the net price of the crop upon the tree. In fact, single orchards are now yielding that income.

I did not intend to make this paper a document for booming California, but a discussion of the future of citrus fruit culture that left out the question of dollars and cents would be incomplete.

While I am sanguine of the future profits of orange culture, I cannot say so much for the future of the lemon business; and as this portion of the industry is as yet in its infancy, but is being developed in a satisfactory, but a very slow way, I will only give that part of the subject a passing notice.

The very best of lemons can be raised in California. They will ripen, however, at the wrong season of the year, and the only question now for our people to ascertain is, How can the lemon be picked in December and marketed in June? This branch of the subject needs more time than I can give it in this paper.

I trust that your Convention will consider the points presented herein, and refute any that may be considered incorrect.

MR. FRANK A. KIMBALL: I would like about five minutes to answer a portion of Mr. Holt's essay. He makes the statement in his essay, which carries with it the general impression, that Riverside won fairly the gold medals at the exposition at New Orleans. The facts are these: I, in conjunction with my brother, prepared an exhibit by purchase, of all the fruit from our Horticultural Society, and carried them to the exhibition at New Orleans. Riverside made no attempt at an exhibition until our fruits passed that place. They asked Mr. Earle to make an exhibit and he utterly declined. Our fruits had not passed Riverside one hour when notices were published calling a meeting at Riverside, to make an exhibit of fruit. Their first fruit was packed on the fourteenth of March. The programme of the committee was, that the fruit should be exhibited before the Judges in New Orleans the fifteenth of March. Our fruit was there and displayed ready for the Judges, one of the calls being for the best, not less than twenty varieties of oranges from any place in the world, a gold medal and \$250, or \$100, or whatever it was. We had thirty-four varieties of oranges to exhibit, and had them on exhibition. The Judges asked us to remove all but twenty varieties. I said, "If the other people would do the same thing, I would do it," which I did. I removed all but twenty. When Riverside came they put out fifty-one varieties of oranges. The Judges went to them and asked them to remove all but twenty, because San Diego County had done the same thing. Mr. Richardson and Mr. Holt utterly refused to do it, in very emphatic terms. Fifty-seven points covers a perfect orange, as insisted upon by the Judges, and agreed to by the exhibitors. They refusing to remove their oranges, they had fifty-one varieties of oranges

judged, which should have a possible 2,907 points. They won 2,323 points, we having removed all our fruit but the twenty varieties, the rest having remained under the glass roof from the fourteenth day of March until the third day of April: while not a piece of the fruit from Riverside was picked until after the fourteenth day of March, and was not on the tables until the day before it was presented to the Judges for their judgment, perfectly fresh, while ours had been exhibited at one Fair, transported to New Orleans, and had been under the glass for fifteen or sixteen days. Out of the possible 1,140 points the Judges awarded us 1,069, in point of superiority, giving us 14 per cent over Riverside at its best exhibit, they refusing to compare with us on the twenty varieties. Technically, they were right in insisting upon all the varieties, because they said not less than twenty varieties, and Mr. Bettner said, "If we have a thousand specimens you would have to judge them alongside of San Diego's twenty." We of course only had 1,069 points, and they had 2,323, and consequently they were awarded the gold medal: but if they had the best twenty varieties why didn't they have the best fifteen? I took the silver medal and \$75 for the best fifteen varieties. Why didn't they have the best ten varieties? I took the silver medal for that. Why didn't they have the best five? I took the first premium and the \$25 for that. If they had the best twenty varieties they should have had the best ten. My argument is, that they should not, because of those medals, won under such conditions—that they should not restrict the area of possible and profitable production of the orange to that locality. Mr. Holt said himself, in my orchard last winter, that there was not the equal of it on the face of the globe. Now, why in the world does he restrict the citrus belt to a little place around Riverside. It is not true; it is not right. I told him to come here, that I wanted him to defend himself, because I should defend myself. In competition with Riverside we did take the sweepstakes for the exhibit of citrus fruits in the State of California. The area of citrus culture is not limited as it is claimed. In the lemon industry it is claimed that they should be picked in December. I claim that the lemon is not fit to pick until March, and from March to June is a short period.

I have a few boxes of oranges that will go from fifty-four to ninety-six to a box, and several thousand oranges on trees only four years old; the equal of it cannot be produced on this globe.

MR. BALDRIDGE: I desire to say one word as to varieties of lemons, and to call attention to the Eureka lemon and the Lisbon. In my locality we propagate those only, and we recognize them as being about equal in quality, although the Lisbon has a little thicker rind than the other, and the Eureka yields a little greater quantity of juice; but one point has not been noticed, which, in my judgment, gives the Eureka the decided preference: the Lisbon is very thorny, and is more liable to be damaged by the wind.

CALIFORNIA CITRUS FRUITS, MARKETS, ETC.

Essay by DR. O. P. CHUBB, Orange.

The rapidity with which California citrus fruits have, within the past five years, gained a foothold in eastern markets, has greatly surprised not only Florida growers but importers from the Mediterranean. That oranges, lemons, and limes were produced on this coast had, of course, long been known, but active competition in quantity throughout the States east of the Rockies was neither suspected nor feared.

Florida, however, cannot be materially affected by the increasing importance of our trade, since her output is nearly or quite consumed before ours is sufficiently mature to take its place. The only point of contest at issue between these two sister States in the citrus trade seems to be one of quality and beauty, or, in other words, a matter of "*points*," concerning which a committee expressed an opinion at New Orleans not long since. The Atlantic cities appreciate fine fruits, and in this respect there is an opening for our growers to meet Florida in her own chosen markets, and before her season closes. The lateness of California's main crop is her strong hold in those cities west of the Atlantic seaboard. This climatic advantage is an important one, and should be well considered in the selection of varieties for planting, since the later the shipments are made the better the prices obtained (at least such has been the case in past seasons) up to the middle of July, when strawberries and other small summer fruits interfere. The great northwest is, however, capable of absorbing our entire product at remunerative prices as early or late as it is in fair or fit condition to place. The States west of New York and Pennsylvania are depending more and more each year on California for spring shipments of oranges, and the heavier consumption is steadily pushing westward. The people there are all interested in California and her fruit products, and will choose her oranges in preference to Mediterranean fruit of like quality and price.

VARIETIES.

By intelligent propagation of imported varieties and stocks, aided by peculiar adaptation of climate, soil, and methods of cultivation, our horticulturists have developed new types of flavor, pulp, and peel, which western taste is not slow to recognize and appreciate. The Washington Navel stands to-day the peer of any orange known in the market, and is really the autocrat of the price list. Following this winner of gold medals and golden opinions come the luscious St. Michael, the sprightly Mediterranean Sweet, the handsome and characteristic Valencia, and late and various improved selections from the older orchards of seedlings, not to mention the average seedling, of a quality equal to anything grown on the coast or islands of the Mediterranean.

HYGIENIC.

All these varieties, as the product of California soil and climate, possess that happy combination of sugar and acid, of flavor and aroma, which not only pleases the palate, but corrects the bile of the eastern consumer as he emerges from the ruins of a supertonic winter into the malarious tendencies of a radical spring warmth, mixed with the vagaries of an obstinate liver. And so he comes to recognize the California orange as not only the proper thing, but as coming in at the proper time, and he proceeds to put it where it will do the most good. It is a new and popular prescription from Nature's California laboratory, and he cries for it daily. The great and growing cities of the Mississippi Valley are learning to appreciate and consume increasing quantities of this class of fruits, filling the gap, as they do, between the ham fat of winter and the chicken broth and fresh vegetables of the heated term in July.

THE MARKETS.

Chicago alone marketed five hundred carloads of oranges for us in 1887, but our best markets are coming still nearer the source of supply. Not

long will St. Paul, Minneapolis, Sioux City, and Omaha, St. Louis, and Kansas City, Denver, and Pueblo, Salt Lake, and Helena, depend on New York or even Chicago for their supply of citrus fruits. With additional competing lines of railroad, speed and efficiency become important factors; low rates and prompt delivery are then subjects of vital interest to common carriers of perishable commodities. "From the orchard to the fruit stand in five days," will constitute the banner of the train, and contracts to deliver at specified dates may yet solve the problem of shrinkage and fluctuating prices. Bright, clean fruit and systematic handling are only requisite to insure a steady demand and profitable return for all the oranges and lemons we can grow.

LEMONS.

Our lemons do not, as yet, compete as successfully with the foreign product as our oranges have done, but the cause lies, in my opinion, wholly with us in our imperfect methods of curing and handling. I have seen California lemons selling at \$10 a box in the city of Omaha for short periods, but only because the foreign stock was entirely exhausted. Such as were still undecayed were repacked in foreign boxes and sold at the above named price with no suspicion on the part of the retailers and consumers of the fraud practiced.

During the past winter good prices for our oranges have been steadily maintained, and I have been besieged with personal letters from dealers in Cleveland, Cincinnati, St. Louis, Omaha, and other western cities, asking for shipments, or consignments on commission, and promising returns at from \$2 50 for fair seedlings to \$6 per box for choice Washington Navels. But the day is past when fine, clean fruit, in good condition, need be risked with commission houses. All that we have to do in placing ourselves upon a permanent basis of prosperity in the citrus fruit trade is to grow good, clean fruit, improve our methods of curing and handling, systematize the transfer and distribution of the crop, and pocket the cash at "free on board" rates.

The Northwestern States and Territories will take care of it all, leaving the Atlantic Coast to be supplied with Mediterranean and Florida stock, excepting when fancy prices for our fancy fruit may warrant a longer haul at a better profit.

Under a perfected system of cold storage and the use of refrigerator cars, such results may be definitely secured as to give us the choice of markets, according to any special demand of the season or locality. This industry is yet in its infancy on this coast, and we may rest assured that the demand for choice fruit at high prices will always remain in advance of the supply.

LEMON CULTURE AND LEMON CURING.

Essay by FRANK A. KIMBALL, National City.

Ladies and gentlemen: The discussion of the subject, "Lemon Culture and Lemon Curing," before the Ninth State Convention of Fruit Growers of California, having been assigned to me, I beg leave to submit for your consideration the results of my experiments, and the limited amount of research I have been able to make.

HISTORICALLY CONSIDERED.

The claim is made by some writers that the lemon tree is indigenous *only* in the northwestern part of India; by others, whose opinions, perhaps, are entitled to equal respect, that Assyria alone was its birthplace, and still by others that Persia justly claims the honor. Certain it is, however, that neither the ancient Greeks nor Romans had any knowledge of this fruit; nor yet was it introduced into Spain until the latter part of the twelfth, or early in the thirteenth century, and to the Arabs, unquestionably, is due the credit of its introduction. Late in the fifteenth century England received her first lemons from the Azores, and for a long period her supplies of this fruit were almost exclusively drawn from these islands.

Through the constantly diverging channels of commerce the lemon has been distributed until it is now grown in the entire region surrounding the Mediterranean Sea, in Australia, and various other islands of the Pacific Ocean, in the United States bordering on the Gulf of Mexico, in Southern California—in fact, in all semi-tropic countries, to a greater or less extent.

Knowing the area of its possible cultivation, and the price at which it can be produced and transported to our markets, the question, "Can we grow the lemon at a profit?" comes home to us as an economic one, and in this light will be considered; and if we can demonstrate that we have the soil and climate adapted to successful cultivation, and can produce a larger crop on younger trees, on the same area of land, the only factor remaining to be considered, which cuts any important figure in the problem, is the cost of labor required in producing and marketing the fruit; transportation being estimated at present rates, or less, the possibilities favoring much lower rates.

CLIMATE.

First of all, is the climate of Southern California adapted to its production? Without hesitation we answer yes; but we must, with equal certainty, qualify the yes, for while the answer applies to *mesa*, or table lands in general in the southern portion of the State, it does not apply with equal force or truth to the river or creek-bottom lands, where there is more or less danger from frost; a slight elevation above the valleys, however, secures almost perfect immunity from permanent damage to trees or fruit.

That the tree and its fruit may be successfully grown in frosty valleys I will not deny, for I have seen it done; but there must be constant watchfulness, and considerable extra labor is required in protecting the trees until the branches extend above the frost line. Instances are not wanting, where young trees planted in river valleys have been killed outright, when the trunks have not been wrapped or otherwise protected; while those which were properly protected suffered only to the extent of loss of leaves and the smaller twigs, and ultimately came into full bearing, and are now yielding generously—so generously indeed, that at nine years from planting a two-year old tree, I have assisted in picking from it more than four thousand fruits in one year.

The location of a lemon orchard on valley land requires careful study. A sheltered nook behind a hill, where there is little or no breeze in the night time, is full of danger, for if frost puts his finger anywhere, it will be *there*. But the study of location is too often left for experiment, even by those whose experience should teach them better. One such trial I saw, where an experienced nurseryman planted more than a thousand Eureka lemon trees, and before two years had passed not a single tree remained to mock his foolishness.

In such localities, the topography of the surrounding country so controls climatic conditions, as to prohibit successful cultivation; but fortunately the area governed by such conditions is exceedingly limited, when compared with the aggregate area which is adapted to lemon culture.

Quite enough successful experiments have already been made to substantiate the claim, that there is ample acreage in Southern California, which, if utilized, would bar all foreign lemons from the markets west of Chicago. Nor need we stop at Chicago, for the superiority of our fruit will create a demand far east of that point.

LOCATION AND CONDITIONS.

In Italy the best results in lemon culture are secured near the seashore, so near that in many instances the trees are planted in the sands which have been washed up by the waves. They are, however, in such cases protected from cold sea breezes by hedges. From the seashore to an altitude of one thousand five hundred or two thousand feet is this industry successfully prosecuted, and in some instances to higher elevations.

In the island of Sicily the conditions are somewhat changed, and although the trees are planted close to the shore, as in Italy, yet the results are unsatisfactory, the trees being more liable to the attacks of pernicious insects, as well as of disease, the best orchards being at a considerable distance from the sea, planted in rich soil, with plenty of water for irrigation: and yet, where the best possible conditions are secured, a tree in full bearing is expected to yield only about six hundred fruits in a year.

In Venitia the lemon is cultivated with perfect success, in soil heavily charged with potash and lime, which makes it of a loose and friable character, and not inclined to bake or shrink, and into which the heat of the sun can easily penetrate.

In Turkey the lemon is planted in rich clay soils, the product being large, and the quality excellent.

The difficulties surrounding the cultivation of the lemon in the vicinity of Venice are greatly aggravated by liability to frost; and so great is this danger that in all orchards provision is made to ward it off by fires, built in and around them, when the temperature approaches the freezing point.

A majority of the lemon orchards in the Mediterranean country being more or less under the influence of moisture from the sea, makes them liable to all the diseases and accidents to which the limited area along the coast of Southern California is subject, while the vast interior country contiguous to it is governed by conditions equal, and without doubt superior, to the best section in the Mediterranean country.

Correspondence with a large number of American Consuls and commercial agents has convinced me that the lemon is successfully cultivated in countries possessing a wide range of soil and climate, and that it will adapt itself to widely varying conditions, in so far as valley, plain, mountain, and sea can affect the tree or its fruit; but as this discussion has relation particularly to Southern California, it is with its soil and climate we have to deal.

SOIL AND PLANTING.

My examinations and experiments lead me to this conclusion, viz.: A well drained soil, the surface of which is sandy loam, with underlying stratum of clay, will produce the most satisfactory results. My theory is this at the outset, recognizing the fact that irrigation must be employed, the object being to dissolve the substances in the earth, out of which the

tree and its fruit is made, and which, without being so dissolved, are as valueless as though they were not in the soil, or, for that matter, did not exist; and it is equally important that these substances be retained in the soil, and within the distance penetrated by the roots of the tree, for the moment they sink to a greater depth they are lost; hence the interposition of a stratum of clay will effect the desired result, by preventing the rapid percolation and ultimate waste of valuable fertilizing materials.

I would discourage the planting of a lemon orchard on "adobe" soil, for the labor required in keeping it in good tilth is too great; but it *must* be so kept or it will shrink and crack, which not only strips the fibers from the roots, but allows the air to penetrate and dry out the surface or fruit-producing roots, a few days of neglect being sufficient to cause the ground to crack to a considerable depth.

The tree and its fruit are everything that could be desired, when planted in adobe soil, but the liability to neglect, and the comparatively large amount of labor required in cultivation, would deter me from planting largely in such soil. This has been taught me by experience on my home place.

I *would plant* in warm well drained soil, with an exposure which would give me the most sunshine; I *would not* plant on the north side of a steep hill. In planting I would adopt the quincunx method, with distance not greater than twenty-four nor less than twenty feet.

Many persons make a sad and oftentimes fatal mistake in planting lemon trees too deep. Nature has settled this matter by throwing out a system of roots at a certain distance below the surface of the ground, and however much deeper the tree is replanted, thus much is nature defeated in her intentions, and there must be a corresponding failure in results. My method of planting is this: a hole is dug large enough to permit every root to be spread out as it naturally grows, and two or three feet deep; set the tree no deeper than it was in the nursery, then with surface earth fill the hole, placing the roots in their natural position, always being careful to keep the ends of the roots as deep as possible; as the earth is thrown in tramp it *hard*, and *then* there will be a little settlement, which will carry the tree a little lower than it was in the nursery. As in the case of all other trees, when planted, the roots must be pruned, and all broken or bruised roots removed, and the top cut back to correspond with amount of root which has been lost.

The scope of this paper only contemplated the "*cultivation*" of the lemon tree, the supposition being that the planter had selected proper ground and location, and had planted the best varieties known in the market; but it would fall short of its *purpose* if no allusion were made to *planting* the tree.

PRUNING.

The lemon tree being a strong and vigorous plant, requires liberal irrigation, and above all, judicious pruning, for almost before a person is aware of it, long straggling branches will hinder cultivation, and must be cut back, thereby entailing an absolute waste and greatly lessening the vitality of the tree.

To prevent this waste and loss, the ends of the branches should be pinched off at the proper time, and with such discretion as will result in forming a symmetrical and well-balanced top; great care should also be taken in thinning out the small and weak branches, so as to afford circulation and allow sunshine to penetrate. Pinching off the ends of the limbs will cause them to throw out spurs, thereby bringing the fruit nearer the

body of the tree. A failure to learn this lesson in time, and before I learned to "practice what I now preach," caused the ruin of a number of my oldest trees.

CULTIVATION.

The same general rules which apply to the cultivation of all other orchards, apply to the lemon. At the first fall of rain the cultivator should be used in such a way as shall stir the entire surface of the ground, and this process should follow every rain; this being well done, I do not insist on having the ground plowed; however, I believe that one plowing in each season is important.

In the Mediterranean country the orchard is kept perfectly free of weeds and grass, the best orchards being thoroughly pulverized at least five times each year. Certain it is that weeds and fruit do not succeed well together, even though a good crop of weeds be plowed under twice each year—a practice insisted on in a paper read before this society at the Los Angeles meeting. In my judgment, if there is any one thing more than another required in reaching satisfactory results in lemon culture, it is thorough and systematic cultivation.

FERTILIZING.

No reasonable man can expect an orchard to bring him a good crop of good fruit, except he shall furnish the materials from which to make such fruit.

Every crop of fruit, and every branch and leaf of the tree producing it, takes away from the soil certain materials. This process cannot long continue without serious exhaustion, and it is plain that these substances must be returned to the soil—nor should we wait until the trees tell us "we are hungry," but, reasoning from general principles, we should apply the proper fertilizers in season, and if the stable does not furnish sufficient amount, resort must be had to commercial fertilizers, to be found in all markets.

To "dress and keep the land" is an injunction placed upon the oldest horticulturist from whose history we can quote, and the man who does not obey this injunction, placed by the highest authority to which appeal can be made, will ultimately chronicle a failure.

A comparative analysis of conditions having demonstrated the fact that we can grow lemons, the next question is, how to reach the most satisfactory results.

VARIETIES.

Many trees have been started from seeds, but, as a rule, have proved worthless, the fruit being large, coarse, and as varied in shape and appearance as apples which are grown on seedling trees. The trees are studied with vicious thorns, the fruit crowded with seeds, the fiber of the pulp exceedingly tough, the rind rough, thick, and more or less bitter, and necessarily deficient in juice. These objections are sufficient to deter any one, embarking in lemon culture for profit, from planting an orchard with trees grown from the seed.

These objections are, however, largely modified by time; the fruit decreases in size, the shape becomes more uniform, the fiber of the pulp firm and less tough, the rind more smooth, reasonably thin, and less bitter, and the juice increases in quantity; yet too many objections remain to permit the planting of seed, except for experiment.

From the vast number of seedling trees which have been brought into bearing, only half a dozen or less have gained notoriety for superior excel-

lence, the best among them being the Eureka, which was produced by Mr. C. R. Workman, of Los Angeles, and which was first brought to notice by Thomas A. Garey in 1877-8. Perhaps the greatest excellence in *quality* is found in the "Lisbon," a variety said to have been imported from Australia. However this may have been, there can be no question in regard to its value as a *lemon*, but it is wanting in some essential characteristics, uniformity in size and shape, and liability to damage by handling.

The hardiest tree, producing the largest quantity of fruit, at the earliest age (of which I have any knowledge), was grown from the seed of a lemon sent to me from New Orleans by Senator J. S. Harris. Buds from this tree have produced most excellent results. Specimens of fruit grown from buds set in lime roots are now exhibited for examination, and the Horticultural Commission, through its Committee on Nomenclature, will be asked to give it a name.

I have never tasted a sweeter rind, nor have I seen finer or more delicate pulp, less seed, or more juice in any other lemon. The tree develops very few and short spines, a punctured lemon being a rare occurrence. From one tree in my yard I picked one thousand and sixty lemons before the bud had been set three years, and this season I have picked more than eight boxes of fruit from the same tree (eight years old).

The public demands the lemon it has become accustomed to, or one similar to it, and the "Eureka," or the lemon above referred to, more nearly answers the purpose than any others.

Many of our lemons require bleaching to bring them to the color of the imported fruit; but this can only be done where fruit is packed by experienced hands.

GATHERING THE FRUIT.

In the Mediterranean country, the lemon is cut—not pulled—from the tree, at any period in its growth, without regard to ripeness, *size* being the only requisite. This fact explains the reason why so many of the imported lemons are bitter, and also why so many of them are deficient in juice. Nature has not been permitted to complete her perfect work.

After being picked the fruit is allowed to lay until the sweating process has carried off sufficient moisture to permit them to be wrapped and packed for shipment, which is done to a very limited extent by the producers, they having learned that which we must, sooner or later, learn, viz.: that to successfully pack fruit it must be done by experienced hands; and when every community has its own sweat-house, where all the fruit can be properly treated and uniformly packed, *then* will our fruit have a market. That the fruit should not be picked when entirely green cannot admit of a doubt, and no evidence of this fact is more conclusive than the absence of juice in a lemon which has been picked in that condition, when compared with a lemon picked from the same tree, but in a more advanced stage of growth.

PACKING.

In Southern California too little attention has been paid to the proper grading of the lemon, and in this fact lies one of the reasons why the cultivation of this fruit for "profit" has proved unsatisfactory. They must be of uniform size; they must be packed in uniform layers; they must be wrapped, and the grower or packer must put his name on the wrapper as a guaranty for their quality; for if the grower nor packer will guarantee their quality, how can the dealer? Take two boxes of lemons, one of them thus packed, and the other with fruit of all sizes thrown in, without wrap-

pers, and is there any one who will doubt which grower will be best satisfied with his returns?

I have tried a great many experiments in keeping lemons, and my best success has been secured in this way: Cut the stems about a quarter of an inch long and lay the fruit carefully in small baskets, and from the baskets pack them in boxes of any convenient size, but not more than a foot deep; or they may be packed in bins or on a floor, when they may be covered with blankets, sacks, or canvas. Let them remain covered from three to four or even six days, when they will be found perfectly wet; this will so soften the rind that it will be flexible and can be handled with safety. The coverings may now be removed so that a current of air will soon dry them, when they may be wrapped and packed, and should be placed where the temperature is as near uniform as possible and entirely protected from air drafts. By this method I have had no difficulty in keeping lemons four or five months. When sent to market an inspection of the boxes must be made. If there be indications of decay they must be repacked, but if no shrinkage is observed it is a sure indication that they are sound.

In regard to cold storage, I have neither experience nor information sufficient to advance an opinion; my impressions are, however, that I would not experiment on a large scale at first.

PERNICIOUS PESTS.

The only pests which I have encountered are the black and red scale and the red spider, the red scale being the most difficult to eradicate, and next to it the red spider.

I have found the formula for insecticide made use of by Mr. Lelong, and published in "Biennial Report of State Board of Horticulture," 1885-86, page 377, to be very effective when thoroughly applied.

Whale-oil soap, in proportions of one quarter to one pound dissolved in one gallon of water—the quantity depending on condition of tree to be treated as well as upon age of insect to be destroyed. Thoroughness of application will give good results with nearly all the washes which have been introduced; the two mentioned I believe to have been most satisfactory.

Immediately on the coast the scale and spider are most troublesome in consequence of the lower temperature and greater humidity of the atmosphere. Too careful watch cannot be kept, and the moment a scale bug or spider is seen, he should be destroyed, as the time consumed in preventing the spread of these pests will be far less than will be taken to destroy them.

Facts and opinions relating to the cultivation of the lemon in various parts of the world might be quoted, but far more valuable are facts and opinions derived from experiences in our own section; therefore, it is proper that I quote from the report of L. M. Holt, Esq., of the "Press and Horticulturist," made after an exhaustive examination in San Diego County of all the conditions embraced in the cultivation of the lemon in that section, believing as I do, that no man in California is more competent to judge of these matters than is Mr. Holt. I quote as follows: "Horticulturists in Los Angeles and San Bernardino Counties all agree that the lemon must be grown on orange stock. Seedling lemon orchards have been abandoned because of inferiority of the fruit, liability of the tree to 'gum' disease, and a stunted growth. This position is now universally accepted as sound." Again he says: "In Mr. H. M. Higgins' seedling lemon orchard, situated about four miles east of National City, on National Ranch, there is not

to-day a diseased tree, or a tree that shows an unhealthy growth; the trees are all vigorous."

In regard to the character of the fruit, Mr. Holt says: "The rind of lemons generally, throughout San Diego County, is smooth, glossy, and thin. After visiting this orchard we carefully noted the condition of the lemon tree wherever we went, and failed to find anywhere a diseased tree, or a vacancy in a seedling orchard, with one exception." Further on Mr. Holt says: "We note this as a horticultural fact, and desire to give San Diego County the credit of having a climate better adapted to the growth of the lemon than that possessed by any locality north of that county."

The results of Mr. Holt's examination into the conditions required for successful lemon culture have been verified by all who have given the subject consideration.

In conclusion, permit me to say, I believe no country on earth possesses advantages superior to Southern California, for producing the lemon, and for many reasons—among them the fact that our trees begin to fruit when very young, thereby enabling the poor man to get returns at a time when his success depends upon it. Our trees produce two or three times as much fruit as do trees of same age in the Mediterranean country, thereby compensating for difference in cost of labor employed in their production; and it is beyond question that when a tree in that country brings six hundred fruits, one of the same age in Southern California may fairly be expected to produce one thousand eight hundred.

We have nothing like the climatic difficulties which are encountered by other lemon-producing countries; we can keep our fruit on the trees till it is more fully developed, thereby saving an immense loss in bulk while undergoing sweating process, and at the same time secure a larger amount of juice from the same weight of fruit.

Yet the one all-controlling fact stares us in the face—our fruit goes upon the market in a totally unmerchantable condition. This is best illustrated by an example. Last Saturday I interviewed the fruit dealers of San Diego, and found Sicily lemons selling at \$9 per box, and domestic lemons at \$1 to \$2 per box, and on inquiring the reason for the difference in price, I received this answer from all of them, viz.: "The Sicily lemon is *good*, the California lemon is *good*—for nothing." And the statement was pretty near the truth, because the former had been properly sweated, properly selected, of uniform size and shape, and were systematically wrapped and packed; while the latter had not been sweated, were as hard as rocks, were of all sizes, from a walnut to a citron, many of them covered with scale and smut, not wrapped, and were thrown into the boxes in the most promiscuous manner. Such fruit does not deserve a market. A few men do properly sweat, wrap, and pack their fruit, and when put in market get \$3 to \$4 per box for it.

It is said that when the retailer gets such fruit he is liable to transfer it to imported boxes, and when so transferred I have yet to find the *expert* who would not declare them to be the choicest Sicily lemons; in fact, a box of such lemons will weigh from five to ten pounds more than the same sized box of Sicily fruit, which means that much more weight of juice.

I would strongly recommend every locality to have a general packing-house, from which to turn out goods of uniform character. When this is done the lemon will do what the raisin has done, viz.: drive the foreign product from the market.

MR. KILLOM: I wish to make one remark as to the suggestion of Mr. Kimball on the lemon. The lemon, as has been stated by him, throws out long shoots and makes a straggling tree—is a very difficult tree to manage

and cultivate around. Now, if I had done as he stated in his lecture, when I put out my young lemon trees, and pinched back the foliage, and done it carefully, and had a symmetrical tree, I would have my fruit banked near the center of the tree, and I would have been prevented from losing one or two years' crops, because, after my lemons commenced bearing, to put my trees in shape I went all around and cut them back, and hence, lost my fruit for one year and partially the next year.

MR. SALLE: I rise to champion lemon culture in Southern California. There are many modes of handling the fruit; there is nothing as an article of commerce that will exceed the lemon, and my experience is that the Eureka is far the best lemon for that purpose; it is seedless, and can be used when perfectly green, from the size of your thumb up to the full grown lemon. If the winds come and blow the fruit off the trees, all you have got to do is to chop them up and make marmalade. It does not get bitter; the sweet rind lemon makes bitter marmalade; but there is no need of one single lemon going to waste of the Eureka variety. Send it to the East when fruit is scarce and there is nothing that will serve so well as lemon marmalade; every family, when they become used to it, will use it largely, and take it all in all, it will go into every market in the United States, and probably be exported.

The Convention here adjourned until the following morning at nine o'clock.

FOURTH DAY'S PROCEEDINGS.

SANTA BARBARA, April 12, 1888.

ORNAMENTAL PLANTS AND SHRUBS.

Essay by HENRY CHAPMAN FORD, Santa Barbara.

Between the thirtieth and forty-second degrees of north latitude, and between the one hundred and fourth and one hundred and twenty-fourth degrees of west longitude, lies the great commonwealth of California. With a more extensive area than any other State of the Union, if we except Texas, a longer shore line, greater topographical diversity, more inspiring grandeur of scenery, variations of soil and satisfactory climatic conditions, need we marvel at the enthusiastic devotion to this favored region that is universally manifested by those who can claim a home in any of its delightful valleys, nor at the widespread interest at present developed throughout the older States and Europe regarding our prosperity. A mean temperature that favors alike the growth of the pine and palm, the apple and the orange, the grape and the fig, the banana and the strawberry, together with the rose and the camellia, the lily and the lotus, ought to prove peculiarly congenial to such of the human race as are fortunate to breathe its equable atmosphere.

A California garden necessarily differs from all others within the limits of our wide land, and the infinite blending of hardy and tender species of plants and shrubs, selected from all zones and longitudes, challenges a parallel in the whole world. The botanic wealth of every clime, unless we except the lowland flora of the extra tropics, is our inexhaustible storehouse.

With these boundless resources, the problem, What shall we plant? becomes a difficult one to solve.

Thus far, with all our horticultural experience in California, we have not reached the limit of experimentation; nor shall we, as long as new species are offered, and intelligent and enthusiastic planters exist. The most carefully selected list of desirable plants and shrubs would not be suitable to all the varied conditions of our extended domain, so much depends upon situation, soil, temperature, and atmospheric saturation. Then again, the available area for ornamental planting places limits on our enumeration for general uses. The cramped city lot requires a more studied selection than the ample grounds of a suburban home. We cannot all have comprehensive botanical gardens, nor should such an extensive collection be desired, unless one aims at experimental and scientific study. In any case, crowding should be avoided, and where groups of shrubs or plants are placed, due care should be had that form and color contrast or harmonize without offending a cultivated taste.

Lest we trespass upon the subject of landscape gardening, we will proceed to point out, to the best of our humble judgment, such species of plants and shrubs as may be considered both desirable and available for general planting within the limits of the State.

I shall speak of the introductions already tested at various points, followed by a list of those new species that promise to be desirable acquisitions, adding such indigenous California species as seem worthy of a place in every collection, taking up each class by itself.

It is hardly necessary to urge the planting of the familiar biennials and perennials of our eastern or European gardens. Certainly, for the sake of old memories, they should not be ignored. Since our childhood days many of these old friends have been enlarged and improved in color, almost beyond recognition. The *Calendulas*, *Carnations*, *Antirrhinums*, *Hollyhocks*, *Perennial Phlox*, *Perpetual Stocks*, *Nasturtiums*, *Wallflowers*, *Verbenas*, *Perennial Poppies*, *Penstemons*, *Delphiniums*, and *Columbines*, among the herbaceous plants, take kindly to our conditions and produce perfect blooms. Since the introduction of the Japanese and Chinese varieties of the *Chrysanthemum*, our gardens may be glorious with color in autumn. They should have special treatment to prevent their blooming out of season in this climate. It has justly become a fashionable flower, and is receiving great attention in England and France, and, of late, our eastern florists have taken advantage of its popularity, and have increased the size of the flowers beyond any limit ever expected. One florist alone has over seven hundred varieties. A greater range of color has been attained in the *Chrysanthemum* than in almost any flower cultivated. Especial exhibitions of the flower are held in Europe and the East, and the example should be imitated in California.

Among the most beautiful of herbaceous plants is the white Japan *Anemone*, the *Spirea Japonica*, *Salvia Splendens* and *S. Patens*, *Justicia*, *Mahernia*, the *Stevias*, and *Cinerarias*, nearly all of which are classed as greenhouse plants, yet need no protection here.

The *Geranium* in California makes quite another showing, compared with the plant of eastern gardens. Its rampant growth prevents planting on limited grounds, except the specimen be rare in flower and foliage. Trained to fences and walls, it may serve in place of hedges. The *Pelargoniums* are at home here; in fact, all the South African plants and shrubs do well in our climate, and those of the Lady Washington type should, for their great variety of lovely color, be found in all gardens. A single *Pelargonium* in Carpenteria has, from its abnormal size, acquired a national

reputation, being one hundred and forty feet in circumference. This class of plants loves sunshine, a rather cool temperature, and will do their best without much water during the dry season.

Fuchsias, in the more moist locations, become monstrous. In one Santa Barbara garden is a specimen twelve feet in height. The plant needs partial shade, rich soil, and plenty of water.

With the new strain of large flowered *Verbenas*, splendid masses of color can be obtained.

Many of our California wild flowers have been domesticated, and now add to the glory of eastern and foreign gardens. Among them the *Eschscholtzia*, *Nemophila*, *Collinsia*, *Godetia*, and several specimens of *Oenotheras*, *Lupines*, *Gillias*, and *Phacelias*. These and many others should not be ignored in our own planting.

BULBS.

The *Gladioli* have been improved in size of blooms and infinity of combinations in color.

The Mexican *Tigridias* do well in California.

The various *Amaryllis* multiply abundantly and bloom profusely with little care.

Hyacinths can remain in the ground from year to year without lifting as in the East, and will yield well formed, full spikes of flowers, if the winter rains are abundant.

Tulips do not thrive in the drier portions of the State, under the present mode of treatment.

A large variety of the *Narcissus* have been produced by the foreign florists, and these beautiful flowers seem to be at their best wherever introduced on this coast.

Most species of lilies take kindly to the prevailing conditions, but they will not thrive where it is hot and dry. The beautiful lilies of Japan are all perfectly hardy here, and will grow in almost any common garden soil, mixed with well rotted manure, together with leaf mold and peat where they can be obtained. *Lilium auratum*, and its varieties, is termed the Queen of Lilies. It is the common wild lily of Japan, where the stems rise from three to twelve feet in height, with flowers from three to one hundred and seventy-five on a single stem. No flowers, unless it be *Olea fragrans*, have so strong a perfume.

The *Iris* and *Sparaxis* are among the most graceful and beautiful of the bulbs, somewhat similar in growth, and requiring the same culture. They should be planted in large beds, and when the flowers, with their rich and varied coloring, open in the sunlight, a picture of gorgeous beauty is presented. These and all other Cape bulbs thrive here.

Anemones and *Ranunculus*, which require protection in the Northern States, are hardy in California, but do not reach the same perfection as in Europe.

The numerous varieties of *Iris Iberica*, *Germanica*, and *Kæmferii* should find a corner in all gardens. The latter has distinct and showy colors, rivaling the orchids, and remains in flower for a period of from five to seven weeks. The old favorite, the tuberose, should not be forgotten in the collection, a few bulbs, with proper irrigation, giving great satisfaction.

The *Cyclamens* produce fine blooms in the outdoor atmosphere of California, and the same may be said of the *Tritonias*, *Watsonias*, and *Babianas*.

Single *Dahlias* have won favor of late with their elegant forms, striking colors, and abundant flowers. As cut flowers they are valuable.

The *Calla* is unanimously planted, and deservedly so, for nowhere else is it so profuse in blooming. From a single Santa Barbara garden one thousand three hundred flowers were cut for the Easter decoration of one church.

The *Fresia*, a beautiful white free blooming Cape bulb, which is in flower from Christmas until June, is a late introduction. When cut and placed in water the flowers continue open for several weeks.

The improved *Tritonias*, with their mammoth spikes of scarlet blooms, are very striking.

Many of our indigenous California bulbs are equal, if not superior, to foreign introductions, and these, where possible, should have a place; especially the *Lilies*, *Fritillarias*, *Brodiaes*, and *Calochortus*.

The tuberous rooted *Begonias* have proven quite hardy, growing unprotected at Santa Barbara, and flowering very profusely.

The *Strelitzia*, a costly greenhouse plant with a striking flower, with common garden treatment thrives and multiplies.

Many of the *Crinums* are beautiful, and delightfully fragrant. Some have been introduced; other species should be.

The *Doryanthes palmeri*, or Queensland lily, is found in many of our gardens. Where well irrigated it throws up a flower stalk to the height of eight or ten feet. It flowered for the first time in Dr. Dimmick's grounds last season, but was somewhat disappointing after glowing descriptions of florists.

The *Eurycles cunninghami*, or Brisbane lily, a bulbous white flowered plant, also from Australia, is quite ornamental.

The ginger, whose fleshy root has commercial value, makes a stately plant with plenty of water, and its large spikes of yellow flowers are very fragrant.

From plants of marked beauty in form, and variegation of foliage, we would choose the following: The *Centaureas*, for their peculiar dusty-miller color; *Alocasias* and *Caladiums*, where water is available; the *Acanthus*, the leaves of which suggested the capital of the Corinthian column; the garden French artichoke, for foliage flower and decorative seed heads; and the *Camas*, some later introductions of which have large, beautiful colored flowers and banana-like foliage, having a tropical effect where properly grouped.

Among the desirable *Aralias*, the "rice paper plant" of China is becoming common in our gardens. The variegated and plain *Coprosmas*, having thick glossy foliage; the *Arundo donax*, a mammoth variegated grass, having canes similar to a bamboo; the *Dracenas*, including the dragon-tree (*D. draco*) and the Australian *Cordylines*, with some of the colored leaved species; the New Zealand flaxes (*Phormium tenax* and *P. colensoi*) and their variegations; the Japan *Elæagnus* with its golden leaves; the variegated leaved *Abutilons*; the spotted and picture foliaged *Farfugiums*; the grand *Musa ensete*, with its spreading banner-like leaves, presenting a tropical aspect superior to all plants thus far introduced, together with other bananas. Many of the foreign and native *Yuccas*; the Mexican and Peruvian *Bonaparteas*, having a singular graceful appearance; nearly the whole family of *Agaves*, most of which, either in or out of the flowering season, are extremely desirable for contrasting effects; the *Aloes*, especially *Glaucia* and *Socotrina*; the *Bambusas*, some of which should be in every plantation, not only for their extremely graceful appearance, but for their varied utility; the *Brugmansia*, from Peru, with a profusion of pendant and strongly

perfumed, trumpet-shaped, white flowers, although common, is exceedingly attractive; the Mexican *Beaucarnea*, throwing up a tall flower stalk having numerous beautiful blooms; the *Poinsettia* with its gorgeous scarlet bracts; the West Indian and Japan *Bocconias*, having pretty glaucous-green foliage; the *Nandina domestica*, or "sacred bamboo," with clusters of bright-colored berries, that is planted around the Buddhist temples of China; the elegant and ornamental *Poincianias* of Madagascar and India; and the hardy palms, *Palmettos* and *Cycads*, the following having been tested in Southern California: *Scaforthia elegans*, *Chamærops cæxelsa*, *C. fortune* and *C. humilis*, *Livistona australis*, *Cocos plumosa*, *Sabal adansonii*, *Corypha australis*, *Phoenix dactylifera*, *P. reclinata*, *P. sylvestris*, and *P. rupicola*, *Areca rubra*, and *A. sapida*, *Rhapis humilis*, *Cycas revoluta*, *Caryota uren*, *Kentia baueri*, and *K. sapida*, and our Pacific species *Washingtonia filifera*, and *Erythea edulis* and *E. armata*, these latter being exceedingly desirable for their rapid growth and hardiness. All the palms are highly ornamental, and, where thriving, no other plants could bear equal testimony to the semi-tropic character of the region. The noble tree ferns of Australia bear open air treatment and may be seen in several of our Santa Barbara gardens.

CLIMBERS.

Within a few years the *Clematis* has risen in favor as a garden flower, and certainly, from the various types, including *Patens*, *Florida*, *Languinosa*, *Viticella*, and *Jackmani*, a charming range of color and dimension of flowers, double or single, can be selected. Either trained to walls or left to wantonly creep over rock work, the results are exceedingly pleasing.

The delicate climbing *Asparagus* is new and desirable.

The *Bougainvilleas*, with pink or magenta flower bracts, make a showy spectacle. They are quite hardy in most situations, at or near Santa Barbara, and also other points in the State.

All the greenhouse *Tecomas* are at home here, and some species make extraordinary growth, and are almost constantly in flower. The same may be said of the *Tasconias*, the scarlet variety covering large spaces each season. Five or six species of the *Bignonias* are introduced. *B. venusta*, with its long sprays of orange blossom, brightens our gardens during the three winter months. The *Passifloras* all do equally well, and among them are some exceedingly desirable ones, notably the *Ark-en-ciel*, *Alba*, *Schmittii*, and *Alata*.

The *Mandevillea*, from the Argentine Republic, has lovely white flowers, and should be in every garden. The *Stephanotis*, in sheltered portions, should be planted for its exquisitely scented flowers. The white and rose-colored *Sapagerias* ought to succeed where the thermometer does not go below freezing point. The fragrant *Rhyncospermum* is a desirable winter bloomer. The *Campsidium*, a free growing climber from the Fiji Islands, with delicate fern-like foliage, and the *Maurandya*, are each pretty. *Antigonon*, or the "Rosa de Montaña," of Mexico, should also find a place, as well as the *Aristolochies*, with their singular flowers. Some of the *Thunbergias* are delicate and beautiful climbers. Of the summer and more hardy climbers, one can choose from the following—all good: *Ipoma Noctophyton*, *Lophos pernum*, *Akebia*, the several species of *Ampelopsis*, *Jasmines*, *Solanums*, and *Myrsiphyllum*, or so called smilax. To cover large spaces in a short period of time I know of no climber that has been tried on this coast equal to *Pilogyne suavis*, whose numerous flowers also furnish excellent bee food.

The *Kennedys*, a beautiful genus of Australian climbers.

The *Actinidia* is attractive, with its thick, oval, shining leaves, clusters of large, white flowers, and showy bunches of crabapple shaped fruits. It is a new introduction from Japan. The Chinese *Wisterias* are also favorites. The English ivy makes good growth in the maritime districts of California, covering walls quite rapidly, and the same may be said of the Japan *Loniceras*.

The *Sollya*, *Clianthus puniceum*, *Hardenbergia*, *Plumbago*, and some of the *Jasminums*, seem to lose their climbing habit in California and become shrubs.

Of the climbers not yet tested on the coast to any extent, I would recommend the introduction of the following, viz.:

Cissus antartica, from New South Wales, and *C. capensis*, from South Africa. I have never seen the *Quisqualis villosa* outside of one Santa Barbara garden. It is a novel, yellow-flowered climber from Burmah, that should have a wide planting.

The *Brachysema latifolia*, a very handsome climber from Australia, should be tried.

Travelers in Japan speak of being perfectly bewildered by the beauty of the climbing *Hydrangeas*. I am not aware of their general introduction.

The *Calampelis scabra*, an orange-flowered pillar creeper from Chili, would thrive here, and the same may be said of the *Fagelia*, a very desirable climber from South Africa. The *Periploca*, of which there are several species from Syria, Canaries, and other countries, is a valuable plant for covering naked walls, etc.

The *Lophospermum erubescens*, a very elegant climber of Mexico, with beautiful pendant rose-colored flowers.

The *Lardizabala biternata*, of Chili, is a hardy, rapid growing, evergreen climber, suitable for covering high walls and trellises. It bears an edible, pleasant flavored fruit, much esteemed by Chilians.

The *Cologania angustifolia*, a beautiful evergreen climber, from Mexico, with lively purple flowers, and *Thladiantha dubia*, a yellow-flowered scandent of China.

AQUATICS.

Where running streams pass through a garden, or where an abundance of water can be obtained from artesian wells, it becomes easy to construct ponds and tanks for the growing of aquatic plants—an exceedingly beautiful and interesting class. Even a fountain basin, with a few such plants, can be made the source of much enjoyment. E. D. Sturtevant, of Bordentown, New Jersey, who has made a specialty of the propagation and growing of aquatics, is about to transfer his interests to the Los Angeles region, and, in the near future, it will not be difficult to obtain the most desirable of these plants. Mr. Sturtevant thinks the *Victoria regia* will bear out of door treatment throughout all the warmer regions of the State. It is the giant water lily of the Amazon, the grandest of all aquatics, producing leaves six feet across; one plant covering a space thirty feet in diameter, the flowers being from twelve to sixteen inches across. Of the most attractive of the class we have the *Nympeas*, *Limncharis*, *Sagittaria*, *Pontederia*, *Owariandra*, *Limnanthemum*, and the *Nelumbium speciosum*, the "sacred lotus" of the Nile, having a rose-colored flower which is delightfully fragrant. Of other *Nelumbiums*, our native species, with sulphur-yellow flowers, and three others from Japan, are desirable. The Egyptian paper plant, *Cyperus papyiferum*, and other species of the family should have a place with the above.

The *Papyrus* has already been successfully grown in California, where

there is plenty of water. The *Arundos*, called *Eulalias* and *Bambusas*, can also be used in moist places. There are a host of other water-loving plants that might be mentioned if space permitted.

SHRUBS.

In the selection of shrubs that are sure to find favorable conditions in California gardens, we have access to such a bewildering list that we are at a serious loss what to indorse and recommend for planting. Those already introduced are but a tithe of the vast catalogue that could be taken from the four quarters of the globe; we could still levy contributions from the regions already represented until our borders would not contain the beautiful species obtainable. The following countries yield up their treasures to enrich and beautify our California heritage, viz: The table lands of Mexico and Central America, Ecuador, Peru, Bolivia, Chili, and the Argentine Republic of South America; the entire European region, Northern and Southern Africa, and nearly all of Asia, including Palestine, the cooler portions of India, and the whole extent of China, Corea, and Japan, Australia, New Zealand, and some of the islands of both the Atlantic and Pacific: add to these selections from the whole North American flora, can we not, indeed, have a wide representation?

Of those species that are denominated evergreen, or those that have persistent foliage the entire year, the following have already been domiciled:

Abelia triflora, from Hindoostan, a handsome shrub with clusters of pale pink, delicately fragrant flowers. Other abelias have also been planted.

Busaria spinosa, from New South Wales, and very showy when covered with a profusion of pretty little white flowers.

The *Banksias*, *Australis*, and *Coccinea*, belonging to the *Proteacea* of Australia, are novel and interesting.

Clianthus puniceus, or "parrot-beak shrub," is an elegant addition, but is liable to be infested with scale insects.

Aster argophyllus, from Tasmania, sometimes called "true aster," is an ornamental shrub, with leaves having the fragrance of musk.

Correa alba, and other species of the same family, with white and scarlet flowers, all from Australia.

Cestrum auranticum, from Guatemala, orange flowered.

Daphne odorata, of China, a dwarf shrub with flowers of exquisite fragrance, blooming in winter.

Diosma alba, a small shrub from South Africa, with delicate heath-like foliage, having exquisite fragrance, which has suggested the name "breath of heaven."

The *Eugenias*, *Australis*, and *Myrtifolia* are large shrubs from Australia, with bright, glossy foliage, white flowers, and purple berries.

Myrtus communis, a favorite fragrant-leaved shrub, from Southern Europe.

Duranta plumeri, a blue-flowered evergreen, from South America.

Eranthemum tuberculatum, a small East Indian shrub, having an abundance of white flowers.

Templetonia glauca, from Australia, a dwarf, red-flowered shrub.

Escallonia rubra, a fine shrub, with red, tubular flowers, from Chili. It is of easy culture, and makes a showy appearance on the lawn.

Gardenia fortunei, the favorite Cape Jasmine, first introduced into England from China, by Fortune.

Malope alba, from North Africa, a small shrub with branching habit and large white flowers.

Guevillea concinna, a beautiful-flowered shrubby species of an interesting class of Australian proteads.

The *Laurestinus*, a species of *Viburnum*, from the south of Europe, is a desirable shrub, if kept free from the scale.

Polygalas, from South Africa, almost constantly covered with purple luminous flowers.

Fabiana imbricata, a heath-like shrub, from Chili.

The *Swainsonias*, with rose, pink, and white blooms, have proved very satisfactory, being free in flowering. They were introduced from Australia.

Psorelea pinnate, from South Africa, a fine shrub with pine-like foliage and blue flowers.

Of the large family of *Veronicas* the *V. imperialis* seems to be the most satisfactory introduction.

Of the *Pittosporums*, from New Zealand, Australia, and Japan, we have several species, all exceedingly desirable in foliage and fragrant flowers, and some having showy clusters of orange berries.

We have two species of the *Habrothamnus*, from Mexico, both satisfactory.

Rapholepsis ovata, a native of China, has fine spikes of white flowers, with dark purple berries.

The *Plumbagos*, from South Africa, should be in every collection, as they are constant bloomers.

Leptospermum scoparium, of Australia, has myrtle-like leaves, that are sometimes used there for tea.

Genista canariensis, or Canary Island broom, is one of the most showy yellow-flowered shrubs introduced into California. The perfume is exquisite.

The *Myoporum vitelinum*, an Australian shrub, with transparent spots in the leaves, is found in many of our gardens.

The *Andromedas* and *Kalmias*, of the eastern portion of our country, have been sparingly planted; yet they deserve more attention.

Many species of *Hibiscus* have found a place in our gardens; but others equally showy should be planted.

The *Bouvardias* have proved very satisfactory, if planted in partial shade, with plenty of water.

Kerria japonica proves satisfactory everywhere.

The *Neriums* (oleanders) seem to be at home throughout California, but do best in the foothill regions of the Sierras. In the south they are infested with scale.

The *Makaya bella* is a lovely introduction from Natal, with trumpet shaped lilac-purple flowers. It requires considerable irrigation in this region to get perfect blooms.

The Japan *Acubas* may do well in some situations in Northern California, but they do not thrive in the south.

The *Berberis*, *Buxus*, *Genista*, *Calycanthus*, *Enonymus*, *Ilex*, and *Pyracantha* all flourish as in their native land.

The Japan *Skimmias* ought to do well, it would seem, but thus far they are not successful, in this region at least.

The Cape of Good Hope *Heaths* are mostly at home here.

The *Indigoferas*, of Australia, thrive satisfactorily.

Of the Australian *Hakeas*, a half dozen of the most showy species of these very interesting shrubs have been introduced, and others should be sought. Many have novel foliage.

The shrubby *Sterculitis*, from the same region, have proved desirable.

Among the coniferous shrubs, we have some of the *Retinisporas* of Japan, and, where well grown, nothing can be more satisfactory.

Several species of the *Metrosideros*, of New Zealand and Australia, have been introduced, that are well worthy a place in every garden.

The *Buddlia lindleyana*, of China, flourishes here, and other species of the family, having yellow, crimson, orange, and white flowers, ought to be introduced from South America and Australia.

The elegant "silver tree" of South Africa, *Leucadendron argenteum*, which is now growing in several Santa Barbara gardens, was first introduced by California amateur florists. Other species of the Cape are nearly as desirable.

Ilex haraguanensis, or South American tea, is a shrub of elegant character, but thus far sparingly planted.

The Chinese azaleas in their endless variety are beautiful and desirable. Of *Azalea indica*, one hundred and seventy-five varieties, and half the number of the Belgian hybrids, can be found in the catalogue of a Flushing, N. Y., nurseryman. In soil containing peaty or other vegetable matter, well drained and in partial shade, with considerable water, these charming shrubs ought to give the greatest satisfaction in our California gardens. Perhaps the *Rhododendrons* are more difficult to manage, requiring coolness and moisture, but in many situations in our State they will no doubt thrive. The *Camellia* should find a place in all our gardens. Plant large, well grown specimens, in partial shade. A shrub of the red variety in Montecito yields thousands of blossoms annually. As in China, the *Camellias* ought to become a tree in California.

The *Chorozema*, which is rare in greenhouses, becomes an open-air shrub here. As it is a winter bloomer, its rich orange pea-shaped flowers brighten the grounds where other shrubs are at rest.

The tea shrub, *Thea bohea*, is ornamental, having bright shining foliage and white flowers. A fine specimen is to be found in a Montecito garden.

SHRUBS THAT OUGHT TO BE INTRODUCED.

Among the desirable evergreen shrubs that, so far as my observation extends, have not yet been introduced to the coast, are the following:

While there is, perhaps justly, an outcry against planting the tall-growing *Eucalypts* of Australia in grounds of limited extent, there should be less objection to the dwarf species of the family, over twenty of which are available, many of which are distinguished for their beauty of form, foliage, and flowers.

A few of the shrubby *Acacias* are to be seen on the coast, but a large number of charming species are yet to be selected to beautify our gardens, if some means is devised for the eradication of the "fluted scale," which finds its most congenial home upon this genus of trees and shrubs.

The *Boronias*, of Australia, are a remarkable free flowering family of shrubs, and would succeed here.

The *Illicums* of Japan and Florida, *Chionanthus fragans*, or Japan allspice, *Cleyera japonica*, *Eury japonica*, *Dendroponax*, *Japonica variagata*, *Ligustrum japonicum*, *Daphniphyllum glaucescens*, all of Japan.

Olearis haustii of Australia, the *Photonias* of Japan, the *Persoonias* of the same region.

Azalea amorena, a Chinese dwarf shrub, the foliage of which turns to a rich brown in the winter.

The Chilian *Azaras*, Chinese *Clerodendrons*, etc.

CALIFORNIA SHRUBS.

While seeking for novelties for the embellishment of our grounds, we should remember we have many shrubs, deciduous and evergreen, growing in the cañons and on the hills and mountain sides of our own State, that are as worthy of attention as any exotic, some of which had never impressed us with their beauty until they had been sought out by foreign florists, and after being propagated abroad have been sent to us as novel introductions.

Let me enumerate some of them most worthy of a position about our homes:

Carpenteria californica. It has hundreds of large snowy blooms, which make a magnificent showing against a background of deep green laurel-shaped leaves.

Berberis fremontii, a large shrub. When flowering it is laden with golden blossoms. Its sap furnishes a powerful yellow dye.

Rhododendron occidentale. This charming California azalea has large, fragrant, white blossoms.

Styrax californica has already been transplanted in some Santa Barbara gardens, where it finds ardent admirers.

Prunus ilicifolia has very ornamental shining foliage, and attractive colored fruit.

Dendromoeon flexile, a beautiful shrub with large bright lemon-yellow flowers, has recently been discovered on Santa Cruz Island. Another species, *D. regidum*, is better known. Both are very desirable.

Lavatera assurgentiflora, the handsome tree mallow, that is found in the gardens of our Spanish inhabitants.

Malvastrum splendidum is a malvaceous shrub, with gray-green leaves and pink flowers, borne in a graceful spike at the end of the branches.

Of the twenty-one species of *Ceanothus* in the State many would be very ornamental in our gardens.

The *Romneya californica* is certainly one of the most attractive shrubs in the whole range of our planting, its immense poppy-like flowers, nearly six inches in diameter, with glaucous-green foliage, being a delight to all.

Heteromeles arbutifolia, the "toyon," or California holly, a large shrub, with clusters of red berries in winter.

Penstemon cordifolius, a shrubby species, with scarlet flowers on drooping branches.

Symphoricarpos racemosus, with white and pink blooms and large white fruit, similar to the eastern snowberry.

Philadelphus gordonianus. Large shrub, with spreading branches and white flowers in loose clusters, resembling the cultivated *Syringa*.

Calycanthus occidentalis, an attractive shrub; would thrive in cultivation if planted near water.

Garrya elliptica, a beautiful shrub, considered a great botanical curiosity in all European collections.

Lyonthamnus asplenifolia is a splendid recent addition to our evergreen shrubs, described for the first time last year by Professor Green. It is from Santa Cruz Island. Its beautiful fern-like foliage will be sure to secure admirers.

Ribes speciosum, an ornamental gooseberry. Its exceedingly showy, fuchsia-like blossoms make it valuable for cultivation.

DECIDUOUS SHRUBS.

Although those shrubs bearing persistent foliage are the more sought after and give the greater satisfaction, there are many of the deciduous species that, in spring or summer, during their flowering season, are equally attractive, and should not be pushed aside for their short period of unsightliness and rest.

Let me mention a few of the most ornamental that are already available at most of the principal nurseries:

Cydonia, or Japan quince, *Forsythia*, *Halesia*, *Clethra*, *Exocorda*, the *Tamarisks*, *Spireas*, *Syringas*, *Wigelias*, *Laburnums*, *Deutzias*, the Japan and American *Stuartias* and *Staphileas*, the *Altheas*, the Japan *Desmodiums*, the large family of *Viburnums*, and the *Punicas*, or ornamental pomegranates and crape myrtles.

THE ROSE.

The justly denominated "queen of flowers" can here be brought to its best estate, the whole family being perfectly at home. A doubt has been expressed that the rosarians of Europe, who have produced our best Teas, would here recognize their children, so superbly are they grown in the favorable atmosphere of California. Less attention has been paid to the introduction of the hybrid perpetuals than to other roses. The most distinctive of the Tea, Bourbon, China, Noisette, Moss, and climbing varieties, are inhabitants of our gardens. Bennett's new hybrid Teas afford great satisfaction in their perfection of flora, color, and perfume. Polyantha roses recently introduced, with their miniature and beautiful shaped flowers in great clusters, are very pleasing. But the Teas are in their glory here, and where grounds are limited, they alone should be planted, as they are rarely out of bloom.

FERNS.

In all grounds where shade and moisture can be obtained, those most delicate and graceful of all plant creations, the ferns, should find a corner. From the most hardy of native and exotic species, a selection can be made that will give perpetual delight.

CACTI.

The *Cacti* are an exceedingly interesting class of plants, needing treatment quite opposite to that of ferns. While most people would not call them ornamental, their strange forms and brilliant flowers entitle them to notice. A little irrigation during our dry season will make them more thrifty.

This lengthy list could be enlarged indefinitely, but with the enumeration shown I trust it has been demonstrated that our choice is bewildering; under our benignant skies an ideal home can be created, that may be as near Eden as ever falls to the lot of mortals, if proper selection from the abundant material and judicious taste in its arrangement be manifested.

MR. McDONALD: Let me say to Santa Barbara that, while we think Santa Rosa can raise flowers unequaled in the State, our visit to Santa Barbara has proven to us that flowers bloom nearly as well, some better than they do in Santa Rosa—especially the rose, for the rose here is unequaled by anything I have ever seen in my life. The only difference I have noticed here in the cultivation of flowers is that here after they put

them out they leave nature to do the rest, while we have to apply the arts, and cultivate them more and preserve them better; but I will say, for large and beautiful roses I never saw them surpass those in Santa Barbara.

MR. SALLE: Mr. President, as the Secretary is near you, and so that he may put the question to the meeting, I wish to offer these resolutions:

Resolved, That a vote of thanks be tendered to our esteemed President, Hon. Ellwood Cooper, for his generous courtesy in providing for this Convention the pleasant excursion to "Ellwood," the beautiful possession of Mr. Cooper.

And we recommend to all horticulturists his example of perseverance and sacrifice, in giving to this coast the benefit of experiments of great value to all fruit growers.

And we refer to his splendid possessions at Ellwood as a practical illustration of these experiments.

The Secretary stepped forward and called for a vote on the resolutions, which were adopted unanimously.

PROTECTION TO THE FRUIT INDUSTRY.

THE PRESIDENT: The question for the morning is "Protection to the Fruit Industry." I made some reference to it in my opening remarks; this question concerns the Mills Tariff Bill now before Congress. I will state to the audience that the political question of the tariff is not before the Convention, nor can it be discussed, but simply the question of the present tariff, or duties on California fruits. At the fifth Convention held in Los Angeles there was a resolution passed asking Congress to increase the present tariff duty on California fruits; at the last Convention held in Santa Rosa there was a resolution passed asking Congress to leave the duties on those fruits as they now exist. The present duty on almonds is 5 cents per pound, on English walnuts 3 cents, on oranges \$1 60 per thousand. The question before the Convention is whether we should pass a resolution asking the United States Congress to leave the duties as they are, or whether we should pass over the subject without taking any action.

MR. SALLE: The last five or six years have witnessed an immense area planted to fruit in the State of California. There has been an immense number of prune trees planted, and many acres planted to the vine. In 1886 there were consumed in the United States about seventy million pounds of dried French prunes. Of that amount the Pacific Coast produced about six million pounds, and there were sixty-four million pounds sent from France. In 1887—I have not seen the figures—the production was not very much greater on the Pacific Coast than it was the year before, but this year there is a large number of prune trees, the result of the planting in 1881 and 1882, that are coming into bearing. We will suppose that the demand in the United States to-day is for about eight million pounds of dried French prunes. Now, if one prune tree will produce twenty-five pounds, and it is not unreasonable to expect that, it only takes three million two hundred thousand trees to produce that immense quantity of fruit. There are to-day planted on the Pacific Coast not less than five million prune trees. Now, gentlemen, when these trees get to bearing what becomes of that industry, if we allow the French prunes to come into the United States and be sold without a protection to the growers here on this coast. There are at least seventy-five million pounds of dried French prunes shipped from France to the United States, and yet we have got trees growing to-day on this coast that will produce more fruit than is consumed in this country in one year. I remarked here yesterday that we had a protection to the orange industry, in the shape of the scale bug, which was

going to keep down the supply, but for the prune we must have some other protection from overproduction besides the scale bug; for, as the price is regulated by the supply and demand, the price will go down to nothing. I need not say anything about the vine, for I am not so well posted as to the vineyards; I am a prohibitionist myself, and have not studied that question so thoroughly; but there are gentlemen in the house who are well posted in that direction, and they know that the same facts exist in regard to that industry that it does in regard to prunes. As has been stated by the President, this proposition is for the reduction of the duty on prunes and raisins one half. We do not feel it to-day, because we have not got the quantity to sell; but I tell you this immense number of trees, that have been planted the last few years, as soon as they come into bearing will require the protection, and I think we had better recommend it.

MR. SALLE [continuing]: In view of this fact I offer this resolution:

Resolved, That it is the sense of this Convention that the United States' import duties on green and dried fruit, nuts, and oils, competing with similar products of the Pacific States, should be maintained.

Adopted.

On motion, the following committee was appointed on nomenclature to name a lemon shown by Mr. Frank A. Kimball: A. Scott Chapman, H. K. Snow, and B. M. Lelong.

The Convention here took a recess till half-past one o'clock.

AFTERNOON SESSION.

The Convention reassembled pursuant to adjournment, PRESIDENT COOPER in the chair.

MR. CHAPMAN presented the report of the Committee on Nomenclature, as to the lemon shown by Mr. Kimball, as follows:

MR. PRESIDENT: Your Committee on Nomenclature beg leave to report as follows:

We recommend that a lemon grown from the seed by Mr. Frank A. Kimball, of National City, be named "Agnes."

This lemon we find is of superior quality, medium size, sweet rind, pulp very fine, with strong acid and very few seeds; also very few thorns, which are somewhat short and blunt. The tree is a rapid grower, but drooping in character—medium dwarf.

This lemon has fruited for six years, and has proved to be a good keeper and a very desirable variety.

Very respectfully submitted.

A. SCOTT CHAPMAN,
H. K. SNOW,
B. M. LELONG,

Committee.

Report was, on motion, adopted.

RESOLUTIONS.

Resolved, That the thanks of this Convention be tendered to Dr. J. B. Shaw, of Santa Barbara, for the free use of this hall for the sessions of this Convention.

Adopted.

Resolved, That the Secretary of this Convention be instructed to communicate with the Senators and Representatives from this State in the United States Congress, asking them to request of the Secretary of State that the publications known as "Consular Reports" be furnished the Board of Horticulture of this State, for its library.

Adopted.

Resolved, That the Secretary of the State Board of Horticulture be requested to formulate a series of questions as to insect pests and their remedies, and forward them to the Secretary of State at Washington.

Adopted.

Resolved, That the Committee on Railroad Freights, appointed at the Santa Rosa Convention, be continued until the next State Fruit Growers Convention.

Adopted.

MR. A. SCOTT CHAPMAN introduced the following resolutions, which were adopted:

WHEREAS, California is a great food producer of canned, and bottled, and otherwise prepared goods; and, whereas, many of these are counterfeited by unscrupulous dealers to the detriment of both producer and consumer; and, whereas, the National Pure Food Association has for its object to unify and organize the sentiment of the country in favor of pure food, drink, and drugs, and the establishment of proper laws to remedy these evils; therefore, be it

Resolved, That we, the fruit growers of California here assembled, indorse the action of the aforesaid association, and respectfully urge the citizens of California to become members thereof, and that a copy of these resolutions be forwarded to their office, at 510 Minor Street, Philadelphia, Pennsylvania.

THE NEXT PLACE OF MEETING.

Letters were read from "The Bureau of Immigration," of Yuba and Sutter Counties, and also from the "Sutter County Horticultural Society," inviting the Convention to hold its next session at Marysville; also, from the "Chico Board of Trade," and from the "Board of Trustees," of the town of Chico, inviting the Convention to hold its next session at Chico.

On motion of MR. SALLE, of Pomona, it was resolved that the Convention request the State Board of Horticulture to hold the next biennial meeting at Chico.

CONCLUSION.

A DELEGATE: Mr. President, before we close I wish to offer this resolution:

Resolved, That the thanks of the Convention be extended to the President and Secretary, and the officers of this Convention, for the able and efficient manner in which they have discharged their duties.

Adopted.

This finishing the programme, the Convention adjourned *sine die*.

B. M. LELONG,
Secretary.

REPORT OF THE STATE INSPECTOR OF FRUIT PESTS.

California Peach Root Borer; history of and remedy for. Strawberry Root Borer. The Sun-Scald Beetle. The Red Orange Scale. The Pernicious Scale. Species of Trees Affected. Natural Enemies of *Icerya*. Banding of Trunks. Gas Remedy. Mode of Treatment. The Process. Doses According to Size of Trees. Modes of Operating Dry Gas Process. The Titus Fumigator. The Generator. Cost of Treatment. Modes of Preparing Washes. Caustics, the object of their use. Predaceous and Parasitic Insects. Podabrus Beetles. Lace-Wing Flies. Syrphus Flies.

Supplementary Report.—Pomona. Successful Olive Grafting. San Joaquin County. Orchards on the Calaveras River. Islands along the San Joaquin River. Colusa County. Oroville. The Olive without Irrigation. El Dorado County. Diamond Springs. Placer-ville. Yaca Valley. Ontario. Miscellaneous Matter.

CALIFORNIA PEACH ROOT BORER.*

(*Sannania pacifica*.)

I regret being unable to furnish a full scientific description of this pest, to accompany the engravings below. It is a new species, but Professor Riley, to whom the specimen was submitted, has not described it yet.

No. 1, the larva, resembles the larvæ of other *Agerias*. Its color is whitish and the head brown. When well grown it is fully one inch and a quarter long. No. 2 represents the cocoon, which, like other *Agerias*, is spun from the castings of the worm. It is dark brown and is generally found imbedded in the bark. Projecting from one end of this cocoon is the last molt of the insect left behind in hatching. Nos. 3 and 4 are representations of the male and female. Here, the distinction between the



Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.

Fig. 1, larva; Fig. 2, chrysalis; Fig. 3, male; Fig. 4, female. All natural size.

Eastern species, *Ageria exitiosa*, and this one, is plain. In the former there is much greater difference in the size of the sexes, the female being much larger in proportion, while with the species in question the difference in size is not so great. The color of the body of the male is a beautiful

*Under date of September fourth, Professor Riley writes: The *Ageriid*, to which you refer, is not yet described. I intend to describe it as *Sannania pacifica*, as it connects through *S. fitchi* with *S. exitiosa*, the eastern peach borer.

steel blue. The legs have tufts of light yellow, but there are no light colored bands on the abdomen, as on the eastern species. The almost transparent wings are edged with steel blue. The female is slightly larger, with heavier body, abdomen dark steel blue, tufts on the anal end conspicuous and black. The upper wings are dark steel blue, the lower, transparent.

The habits of this insect are similar to those of the eastern peach root borer, yet it differs essentially, and in such manner that it must be considered less dangerous.

The tunnels made by this borer are almost vertical, varying from four to eight inches in depth by three to four inches in width, and the disposition to girdle the tree does not seem to be so apparent as by the eastern borers. Frequently five or six borers were found which had not girdled the tree yet. Furthermore, it does not seem to work above ground. Its presence was noted especially on heavier land, while on very light sandy soil it was notably absent. Its presence is also invariably indicated by copious gum exudations below ground. Its preference is peach roots, yet we found instances where cherries (Mazzard stock) had been affected.

Remedies.

The moth lays its eggs at the base of the tree, and by preventing access to this we have a remedy. The fact of their presence being hardly felt on light, sandy soil, points to the advisability of the placing of sand from four to five inches deep around the base of the tree; but better than this would be a complete wrapping of the trunk, from several inches downward to six inches upward, with stout paper, or paraffine paper, which is tied well or held in place by a collar of mortar.

Remove the earth from around the tree to the depth of a few inches and a few inches from the tree, and fill the basin with air-slaked lime, piling it up a couple of inches above ground. Possibly ashes may serve the same purpose. All trees affected should have the wounds plastered over with damp clay after all the worms have been killed, and then protected as indicated above.

We do not favor the use of gas lime—it may do as much harm as the borers themselves.

STRAWBERRY ROOT BORER.

(*Egeria impropria*, H. Edwards.)

Fore winged, bronze black, with the internal margin rather broad, and inclosing an orange line. The intronervular marks of the posterior margin are also orange, as are the edges of the discal mark. Fingers of both wings, bronze black. Antennæ, steel blue. Head and thorax, brownish black, with the collar and narrow lateral stripes pale yellow. Abdomen, with second and fourth segments, edged posteriorly with pale yellow. Caudal tuft, black above, orange at the sides, black beneath, except the tip which is orange. Palpi, yellow above, black beneath; tip, also black. Legs as in *Ag. perplex*.

This insect is found in various portions of the State, doing considerable damage, forcing the growers to resort to replanting much earlier than otherwise would be necessary. The life history of this insect has been but imperfectly studied so as to be a proper guide for means of prevention. The grub (see figure) passes the winter through in the larva state, feeding on the root. In June, probably the mature insect issues, which lays its

eggs right at the edge of the ground, after the manner of other *Egerias*. The common practice of flooding the vines has a great tendency to kill out the worms, and if the water was retained, say four to five days during the winter, all over the plants, doubtless all the larvæ would be killed.



Fig. 5.



Fig. 6.



Fig. 7.

Fig. 5, larva; 6, root of strawberry with chrysalis showing the characteristic way the moth escapes from the chrysalis; 7, imago.

THE SUN-SCALD BEETLE.

(*Xyloborus xylographus*.)



Fig. 8.

For some years it has been noticed that early in the spring, trees, especially plums and apples, have suddenly shown all symptoms of dying. A close examination would generally reveal the bark clear to the sap wood in state of putrefaction. Invariably the tree also would be found more or less pierced with minute holes, and in this the little beetle, figured here, would be joined.

The close resemblance of this to the eastern blight beetle led me to believe that this insect was the primary cause of the tree failing, but I have recently arrived at the conclusion that the tree has been damaged to such an extent by the sun, that the sap being then rich in sugar has fermented, causing decay, and that the insect has been attracted from this cause.

The remedy, therefore, here again is having the trunk well protected. If trees are seen to be affected in this manner, they must be cut back to a few branches at once and the wound dressed with grafting wax.

RED ORANGE SCALE.

(*Aspidiotus auranti*.)

The great importance of knowing this, one of the most destructive species of scale insects, causes me to reproduce the plates of two varieties of orange scale; true type, Plate III. This variety was evidently brought to Los Angeles from Australia, where it is considered by far the most destructive scale. This variety infests all parts of the tree alike—leaf, branch, and fruit. The massing of the scale along the shoots causes them to wither from the tips downward, and afterwards causes the tree to lose all its leaves. In color, the scale is darker than the other variety in Plate IV.

PLATE I,



Lith. Britton & Rey, S. F.

Aspidiotus Perniciosus (Comstock.)

PERNICIOUS SCALE



PLATE II.



PLATE III.



Lith. Britton & Rey, S. F.

Aspidiotus Auranti (Maskell.)

RED ORANGE SCALE—TRUE TYPE (Australia.)



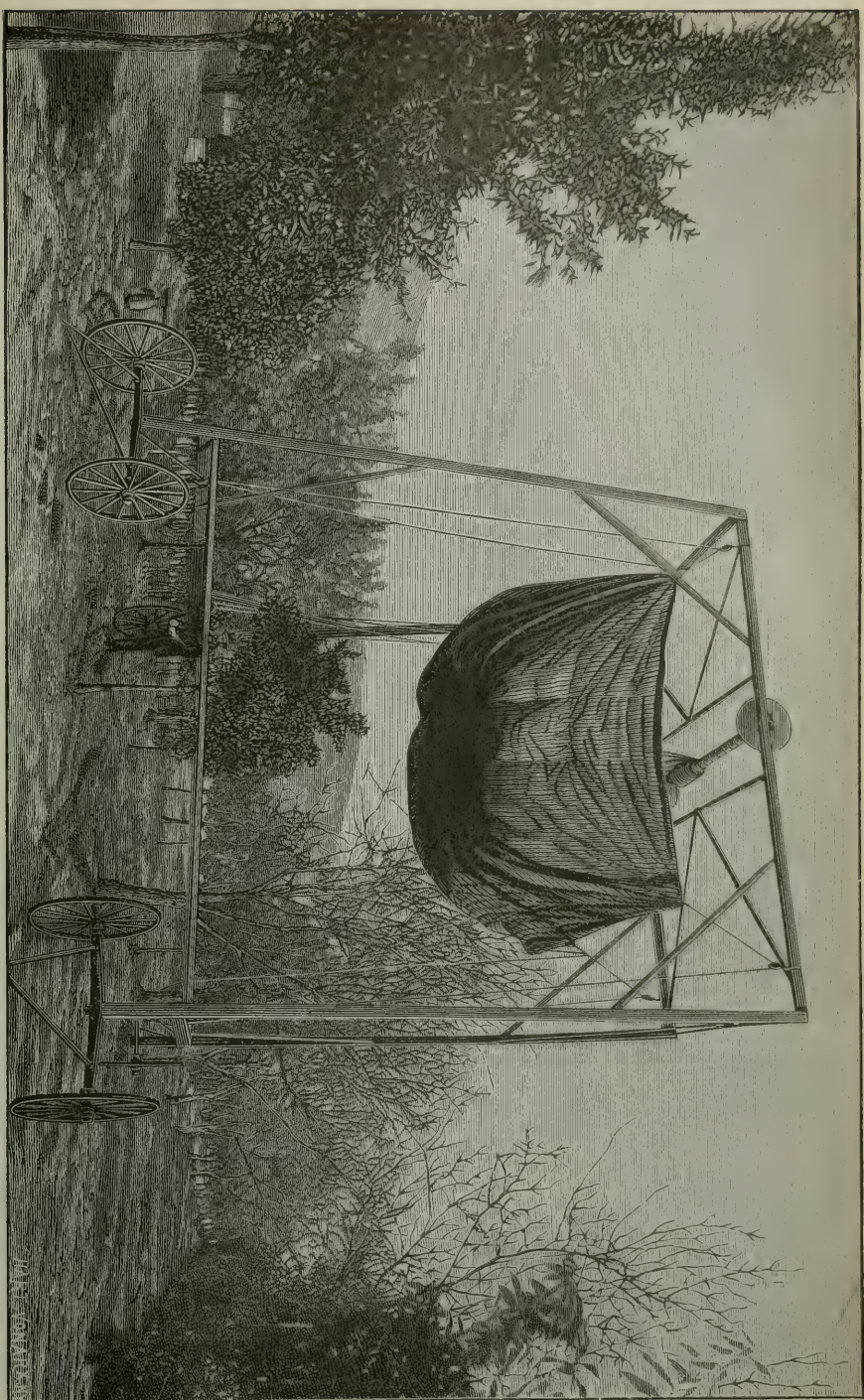


Lith. Britton & Ray, S. F.

Icerya purchasi (Maskell.)

FLUTED OR COTTONY CUSHION SCALE

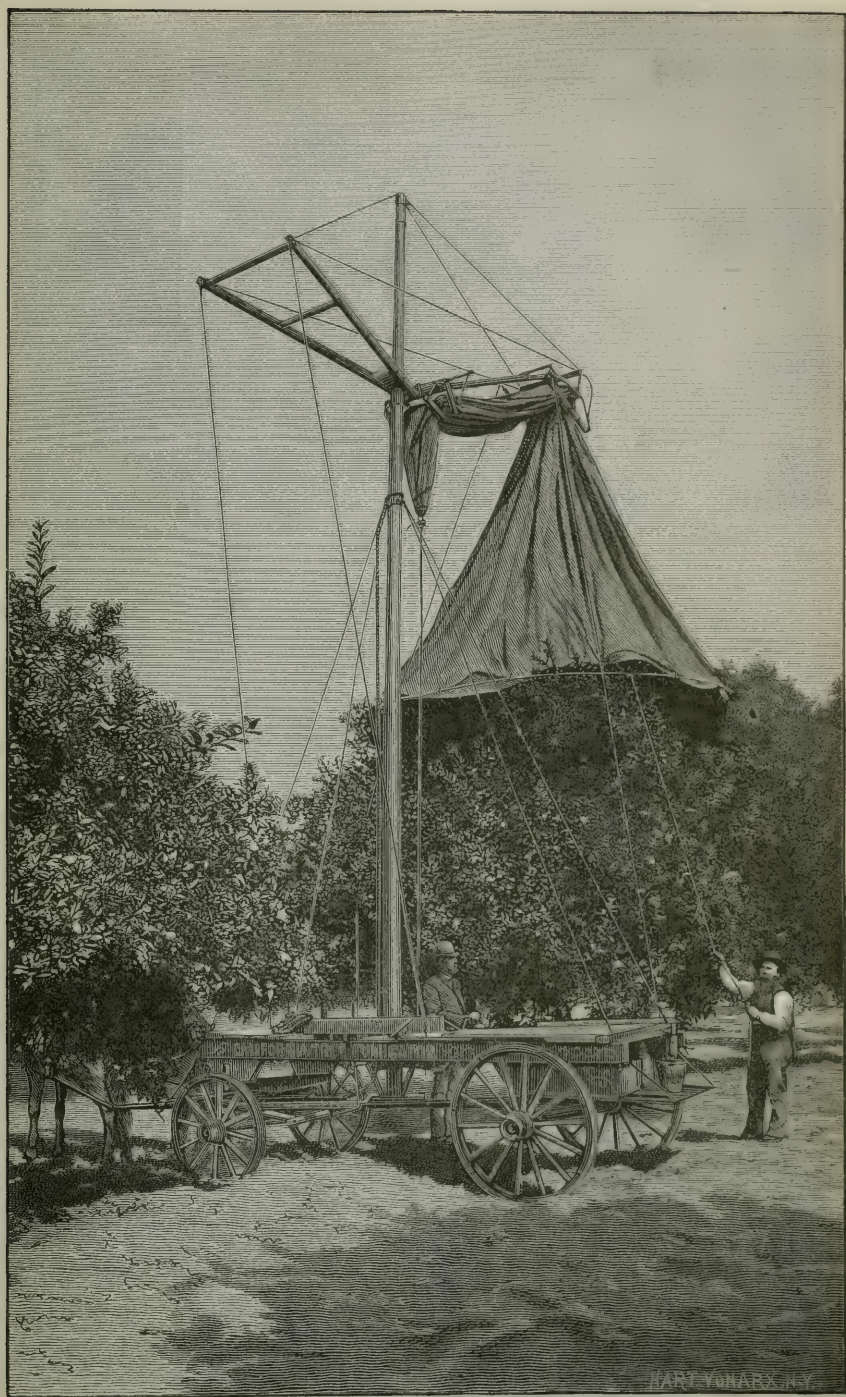




TITUS FUMIGATING APPARATUS.

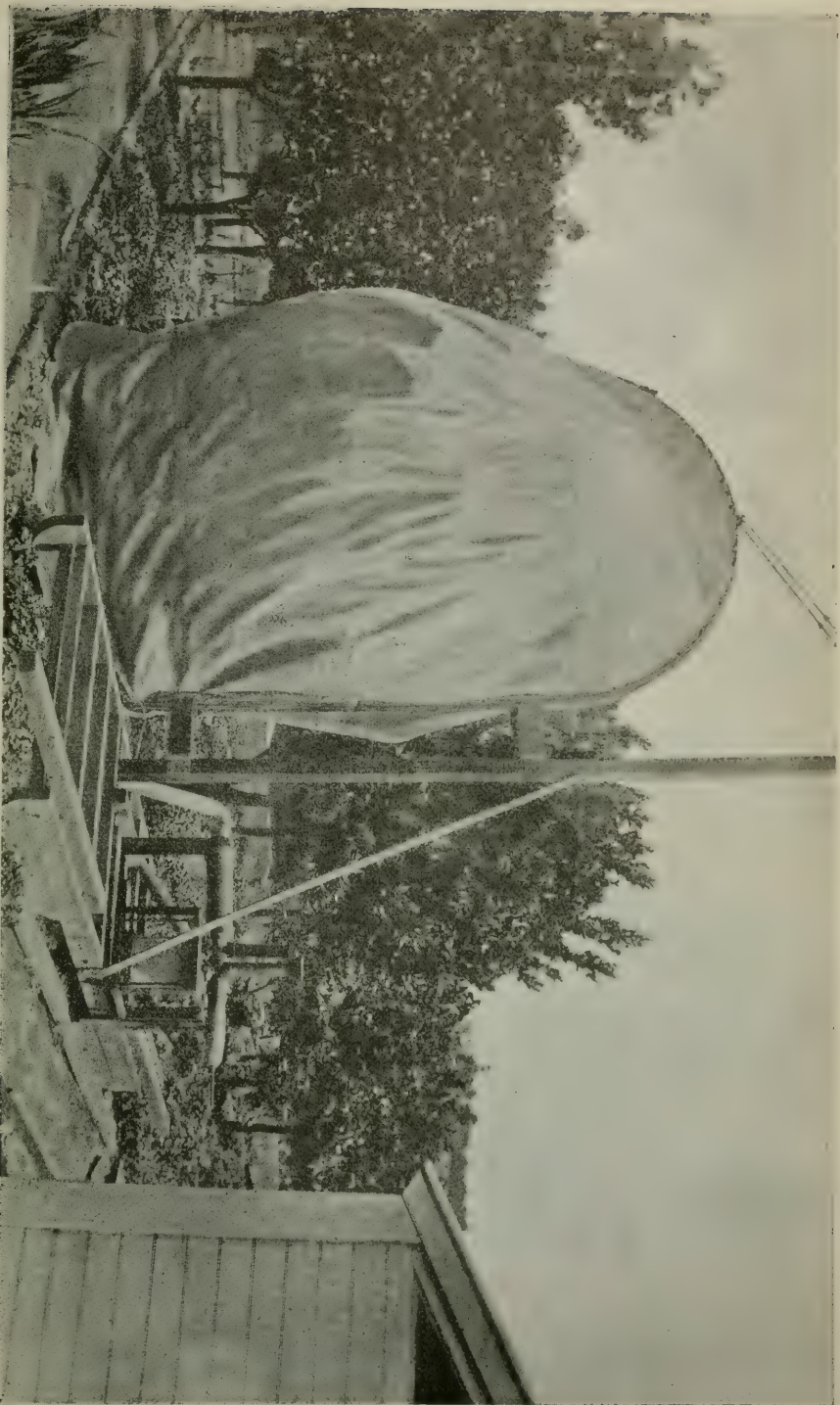
W. H. CHAMBERLAIN





WOLFSKILL FUMIGATING APPARATUS.





CULVER FUMIGATING APPARATUS AND MORSE GENERATOR.



MORSE GENERATOR.

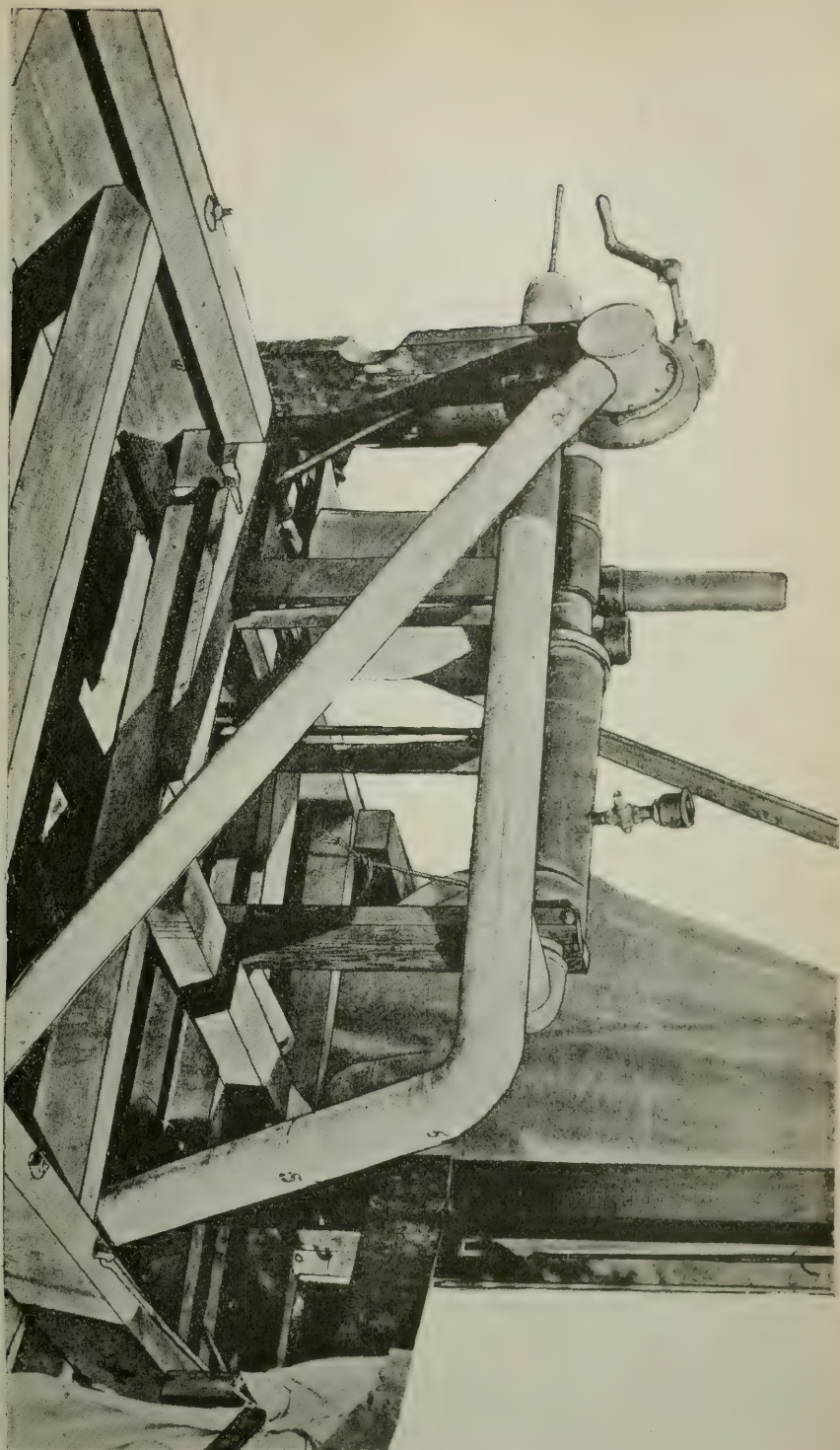




Plate II aims at representing the natural appearance of the true type. The branch at No. 1 shows the characteristic dying off.

Plate III is a representation of the light colored red scale, by some called the San Gabriel scale, because of its prevalence in the valley of that name. This variety has evidences of having been imported from Japan, as orange trees brought from that country are always more or less infested with it. Although a most persistent and difficult scale to eradicate, it does not seem to have proved as formidable an enemy as the true type.

From what I can learn about this scale in Japan, it appears that it is not troublesome there, at least the native gardeners with whom I have conversed, do not consider it so. The slight damage done must undoubtedly be attributed to parasites keeping the scale in check. These it might do well to import.

The following is a description of the red orange scale taken from Professor Comstock's report: Scale of female, light gray, quite translucent, its apparent color depending on the scale, varying underneath from light greenish yellow to a bright reddish brown; the central third (that part which covers the second skin) is as dark and usually darker than the remainder of the scale; and when the female is fully grown the peculiar reniform body is discernable through the scale, causing the darker part of the outer two thirds of the scale to appear like a broken ring. The female is light yellow in color in the adolescent stages, becoming brownish as it reaches maturity. When fully developed, the thorax extends backwards in a large rounded lobe on each side, projecting beyond the extremity of the abdomen and giving the body a reniform shape. The male is a light yellow, with the thoracic band brown and eyes purplish black.

THE PERNICIOUS SCALE.

(*Aspidiotus perniciosus*.)

The continued spread of this scale to new regions of this State, and the ignorance of a great many, as regards the appearance of this, the worst pest of deciduous fruit trees, have caused us to reproduce Plate I. The pear shows the distinct red marks left around the spot wherever the insect stings, which is especially conspicuous on certain varieties of pears. The branch also shows it quite plainly. When trees are badly infested, the bark becomes completely discolored, turning a deep red. The color of the full grown covered scale is grayish, the nipple darker; the young scales appear like fly specks. The female scale itself is pale yellow and almost circular in outline. The young larvæ are quite active, of a pale yellow color, and barely perceptible with the naked eye. The first hatching is generally in May, or, as it might be put, when the cherries are turning color. Another occurs in July, yet another in September or October. The young scale finds lodgment under the buds, and in this way often escapes detection, and is thus carried on young nursery stock.

Species of Trees Affected.

This scale affects peach, plum, apple, pear, and various other trees, but there is, nevertheless, a great difference in the severity of its attacks among the different varieties of fruit trees mentioned. I have sought to discover the reason of this preference, and I believe that it is due chiefly to the texture of the bark; thus, the Napoleon Biggarreau cherry has a thick porous bark, and suffers much, and the Black Tartarian has a hard bark

and suffers scarcely any. The same seems to hold true with certain varieties of pears, yet there seems to be exceptions to this.

Natural Enemies.

In former reports we have dwelt on the subject of the lady bug, *Chilocorus*, as an important help. Of true parasites, until lately, but few have been observed. Two years ago I saw traces of their work in Fresno, but obtained no specimens. It appears, however, that in Los Angeles County there has been a species of *Aphelinus*, a small parasitic fly, doing much good, so much in fact, I learned from Mr. A. Craw, that it has exterminated the scale almost completely in a badly infested orchard. This species of *Aphelinus* is a new one, and has been forwarded to Mr. L. O. Howard for determination.

OTHER SCALE INSECTS.

(Lecanium Sp.)

For the last few years a native species of *Lecanium* has been spreading in certain parts of the bay counties. This scale resembles somewhat the soft orange scale, but differs materially, one of the principal differences being that the former is viviparous (that is, the young appear directly from the body of the mother), while the latter shows the presence of eggs for some time. For want of better scientific description, which will appear later with its correct name, I give this: Eggs, white; female's larva resembling closely the *L. olea*, but is even smaller, and when first fastened to the leaves is so transparent that its presence can only be detected by a glass and by the stickiness of the leaves. The eggs hatch generally in June, and the young scatter in a few days. The insects do not grow very much the first six months, but toward spring and in early summer increase enormously in size, and in May appear as beadlike projections along the branches, often reaching a diameter of one fifth of an inch. There is but one brood in the season, and they all seem to hatch nearly the same time.

Remedies.

For summer treatment, immediately after the fruit has been gathered, the summer wash recommended under the head of the pernicious scale is recommended.

For winter treatment, two thirds of the strength of the solution is recommended for the same scale.

This scale affects especially prunes, plums, apricots, peaches, but also the pear.

FLUTED OR COTTONY CUSHION SCALE.

(Icerya purchasi.)

In our last biennial report a full scientific description appeared of this insect, and as this will be republished in a small treatise I am just preparing, I will only refer to the colored plate, with a short, popular description.

Plate IV, Fig. 1, gives a general idea of the insect as it is found on a Japanese dwarf orange tree, natural size. Figure 2 shows a female much enlarged; the egg sack, which covers the numerous pink, oval eggs, is partly laid open, showing these and some of the newly hatched young; beside the figure is a young, enlarged. Figure 3 shows the female full-grown,

enlarged. The young molt a number of times, and when a few weeks seated along the leaves, the skin comes off as a white sack, as it is attempted to show on the plate. Trees infested soon become a disgusting sight, owing to the black smut which grows rapidly on the freely exuded honey dew, the leaves gradually become yellow and at last drop off.

The fluted scale infests chiefly evergreen trees, and seems to have a special liking for Australian plants, notably the Acacia tribe, which, on account of this insect, in many sections of the State has been replaced by other trees. Of fruit trees, the orange family is especially subject to its attacks, and its ravages in this country, as well as in South Africa, have been very severe. But although there exists many plants which are but little affected by this scale, there are scarcely any on which it may not find lodgment for some time, until a better suited subject is found. Falling to the ground, they will exist on weeds and grass for some time, on some, such as nettles, thriving most wonderfully. It is this habit that has made this insect the most difficult to exterminate when well established.

Natural Enemies of Icerya.

During the last few years a great deal of interest has been taken in the subject of parasites on scale insects, as well as other enemies of these foes of vegetation. In Professor Riley's report of 1886 a few insects are mentioned as preying upon this insect, the most abundant of these being a species of moth, *Blastobasis iceryaella*, in its larvæ state, probably feeding on living scale. On the eggs, Mr. Koebele records the ambiguous ladybug, as also a tenebroid beetle, *Blabstinus brevicollis*, feeding. He found, also, a large, brilliant red mite, which I, too, have seen very plentiful among the *Icerya*. To this must be added the larva of a lace-winged fly, *Chrysopa*, not sufficiently identified to be named, and the larva of *Scymnus marginicollis*, a small gray-colored ladybug. A number of the latter were observed by Mr. A. S. Chapman and myself a few years ago last summer. The larvæ were imbedded in the egg-sacs, and had eaten portions of them. I am not aware that this insect has been observed before in this capacity.

However, all these insects seem to have had no perceptible effect on the fluted scale. Of true parasites, a single instance is recorded by Professor Riley of a hynenopterous insect, which Mr. L. O. Howard has named *Isodromus icerya*. It is a minute chalcid fly. So far it has not been observed as exerting any influence in restraining the *Icerya*.

In Other Countries.

While in California we have been but little favored with natural enemies of *Icerya*, it seems that other countries have been more fortunate. In the interesting treatise by Miss E. Ormerod, of England, my attention was first drawn to the matter. In consequence, I began a correspondence with Mr. Frazer S. Crawford, of Adelaide, South Australia.

In a paper, read at the Santa Barbara Convention of 1888, I gave an outline of the result of this correspondence. Since then I have received two packages of insects from Mr. Crawford, found parasitic by him on both the large native *Coccid monophlebus* and the *Icerya*, and the presumption is, that the scarcity of the *Icerya* in that country is partially due to the presence of these parasites. The first package arrived in April of last year, having been sent by mail. Being absent myself, at the time in Los Angeles, the specimens were kindly taken in charge by Mr. Koebele, in Alameda, and confined in a jar filled with *Icerya*; the supply of parasites

being so small that it was thought that this manner of preserving them was best. A few flies were living when the box was opened by Mr. Koebele. Probably more escaped when it was opened at the Custom House. The bugs in which the parasites were sent were all dead and dried up, yet twenty days after they arrived Mr. Koebele observed flies hatching out from the dead. As many as twenty flies had been found in one of these *Monophlebi*. The vitality of these parasites seemed to have been impaired, and in spite of Mr. Koebele's efforts they all gradually died. At the same time Mr. Coquillett received also some specimens from Mr. Crawford. These had been sent on Professor Riley's suggestion. These were confined on an orange tree inclosed in a fine net. At first, these seemed to do well, but after awhile they, too, died, evidently leaving no progeny. After these failures, I concluded to try another method of transportation, and, through the kindness of Mr. J. D. Spreckels of the Oceanic Steamship Company, I was promised permission to have a consignment sent by the purser of the steamer direct, the package to be placed in the ice chest, so as to avoid the climatic changes of the voyage across the line. Mr. Crawford again collected a small colony of *Monophlebi* and *Icerya*, the latter being especially scarce. The box was well cared for and arrived on the steamer Zealandia in the middle of June. On opening the box, it was found that one fly had already hatched, and that one of the *Monophlebus* was alive. To take advantage of these favorable conditions, a large wire cage with very small meshes, twenty to the square inch, was immediately ordered, but as this could not be made ready in time, the little colony was tied up in a branch of a laurel tree, thickly infested with *Icerya*. At the time a number of flies were hatched, but had all died. A week after, the cage was ready and was placed over the tree. On examination but little change seemed to have taken place in the condition of the bugs (*Monophlebi*), merely some of them having dried up. Examining them again a week later, I found, upon cutting open one of these dried bugs, a large number of healthy cocoons. It is therefore to be hoped that some of these may be enabled to adapt themselves to the changed conditions and lay the foundations for a future colony.

There seems to be no serious obstacle in the way of introducing these parasites from Australia, except their remarkable scarcity. And this, in spite of his endeavors, has prevented Mr. Crawford from sending more than a few specimens. The mission of Mr. Albert Koebele, who has been chosen by Professor Riley to go to Australia, is therefore of extreme importance. And in this choice, Professor Riley is to be congratulated, as, perhaps, no other person on this coast is better adapted for such a mission. We shall follow his movements with the keenest interest.

From South Africa I have heard nothing, since the letter published in my Santa Barbara paper, but I trust that in due time the promised lady-bugs therein mentioned may arrive.

As regards the feasibility of bringing from Hermosillo any of the insects presumed to be parasites, it would seem to be an easy matter. But by late advice from Mr. Wolleb, who has since returned from that place, I have learned that the fluted scale again has increased greatly. The question then is, what was the check exerted on it a year ago, when it apparently disappeared altogether. To be settled, the question requires investigation on the spot. We also learn from Mr. Wolleb that the fluted scale was not noticed in Hermosillo previous to 1884, and that it was found on a twenty-year old citron tree. Whence the insect came, nobody can conjecture, as no trees are imported to that State.

The Original Home of the Fluted Scale.

In spite of the diligent inquiries sent to various parts of the world by different naturalists, this question still remains unsolved. But indications are that it probably is at home in the South Pacific region. Professor Riley's late investigations have convinced him that the sugar louse of Mauritius, *Icerya sacchari* and *Icerya purchasi* are distinct species, as Mr. Maskell contended.

Remedies.

There are no species of insects existing in this State on which so many different remedies have been tried, and some of the simplest have proved the best.

Caustic solutions have the disadvantage of hurting the tree, and are not especially adapted to penetrate into the egg sack, which, on account of its peculiar texture, repels most liquids.

Various soap solutions, some containing kerosene and some whale oil, have proved fair remedies, but cannot, in my opinion, be equaled by the resin solutions, of which I give three formulas. The first was first tried by Mr. A. Koebele; the second by Alexander Craw, of Los Angeles; the third has been given me by Mr. L. D. Green, of Sacramento. From personal experiments with them all, I am well satisfied with them.

Recipe No. 1.—Four pounds of resin; three pounds of sal soda; water to make thirty-six pints. Dissolve the sal soda in a few pints of water; when thoroughly dissolved add the resin. Heat until dissolved, and add water finally. Use two quarts of solution to the gallon of water. Use at a temperature of about 100° Fahrenheit.

Recipe No. 2.—One pound of resin; one hundred gallons of water. Prepare as above.

As, perhaps, owing to the nature of the caustic, the leaves are sometimes liable to be affected, I should recommend the spraying of the trees with pure water liberally two or three days after the applications of the resin solutions; the water will free the pores of the leaves. These solutions being cheap they may be used liberally, and two or three treatments a year would, I think, keep the trees in fair order.

Recipe No. 3.—Sixty pounds of resin; sixty pounds of tallow; ten pounds of potash, dissolved in ten gallons of water; ten pounds of caustic soda (Greenbank, 98 per cent). Dissolve the resin and tallow; when dissolved, add caustic water slowly. After the mixture is made, add ten gallons of water. Use at the rate of one gallon of mixture to ten gallons of water.

In the case of the black scale I have found the addition of sulphide of soda, at the rate of one gallon to seventy-five of resin solution, the strength of sulphide being one pound of concentrated lye to two pounds of sulphur, beneficial, and I should recommend the trial of this for *Icerya*. In several orchards in Santa Barbara cold water has been sprayed on the trees with great power, but while it must be considered superior to many of the injurious ingredients used, it is only by its constant application that trees can be kept clean.

Banding of the Trunks.

A most essential help in checking the fluted scale spreading, whatever method of cleaning is used, is the placing of bands on the trunks of the trees, say six inches from the ground. For this purpose strips of sheep-skin, the hairy side turned in and the smooth side out, have proved valuable. The bands should be drawn as tight as possible, and the outside covered with a mixture of molasses or printers' ink, or any substance that

will remain sticky for some time. The minute scales which are constantly traveling during the summer time will be either caught in the sticky solution or find lodgment in the wool. From time to time the bands must be taken off and dipped in scalding water and carefully replaced. The portion of the trunk below should be washed with a strong resin solution three times as strong as any recommended above.

Gas Remedies.

In my last report was given an account of the various experiments made by different parties. In the recently published report of Professor Riley, United States Entomologist, Mr. D. W. Coquillett, of Los Angeles, gives an exhaustive account of experiments with various gases; but I am of the opinion that none will supersede the hydrocyanic gas first used by Messrs. Craw, Wolfskill, and Coquillett, and later discovered and recommended by F. W. Morse, of the University of California.

The opinion then expressed, that no doubt appliances which would make the application of the hydrocyanic gas void of danger and cheapen the process, on the whole, I am glad to say, has been fulfilled, although my sanguine expectation, that all eggs could be killed, has failed. While it may be done, and has been done, so many intervening causes, especially the difficulty of keeping a tent gas tight, in a treatment of an orchard, we dare say the only practical way of exterminating the insect will be by two treatments, say four weeks apart. The first treatment would exterminate large bugs, everything not in the egg state, and the majority of the eggs. The second, all the remainder—the eggs then being hatched.

Modes of Treatment.

In Bulletin No. 73, Mr. Morse gives full directions for using the gas. To avoid the injury to the foliage, which, according to the later investigations of Mr. Morse, is due to free ammonia gas, Mr. Morse employed carbonic acid gas which was generated simultaneously by pouring the mixture of cyanide and carbonate solution together into the receiver.

The Process.

I append the following from Bulletin No. 73, of Experimental Station of Berkeley:

Solutions.—The cyanide of potassium solution (not the "mining cyanide") is prepared by dissolving the salt in the proportion of ten pounds to two gallons of water. Place the cyanide in the vessel in which you wish to make the solution and add the water to it, bring nearly to boiling with occasional stirring, and let it cool. It is best to make the solution one or two days before using, in order to avoid as much as possible the stronger odor of a freshly prepared solution.

In the prescribed dose an excess of acid has been recommended, in order that complete action shall always take place. It is desirable to test the residue occasionally, to be satisfied that the work is complete. This is done by adding a little more acid and noting whether boiling or effervescence takes place upon stirring; care being taken not to mistake the effervescence from the material accidentally gathered on the sides of the cylinder during the operation for that of material which should have been acted upon in the bottom of the cylinder.

DOSES ACCORDING TO SIZE OF TREES.

The regulation of the doses for the different sized trees, so as to produce uniform treatment, is calculated on the basis of the results of the experiments which determined the amount of each constituent for a twelve-foot tree. The following table indicates the amounts for trees of different dimensions of top, based upon the rates of cubical contents.

The amount of material for each dose differs from that previously recommended (Bulletin 71), by a decrease of one fourth in the amount of soda, and a slight change in the acid; the cyanide remains the same. Varying amounts of soda were used, showing quite

clearly that a decrease of one fourth was possible, but further than this an appreciable lessening in the preservative effect was noticable:

SIZE OF TREE.	Cyanide of Potassium—Fluid Ounces.	Bicarbonate of Soda—Pounds.	Sulphuric Acid—Fluid Ounces.
Five feet	1.6	.1	.9
Six feet	2.5	.2	1.6
Seven feet	4.0	.3	2.6
Eight feet	6.0	.4	3.8
Nine feet	8.5	.5	5.5
Ten feet	11.5	.7	7.5
Eleven feet	15.5	.9	9.9
Twelve feet	20.0	1.1	12.9
Thirteen feet	25.4	1.5	16.5
Fourteen feet	31.6	1.9	20.5
Fifteen feet	39.2	2.2	25.3
Sixteen feet	47.5	2.6	30.7
Seventeen feet	57.5	3.1	37.8
Eighteen feet	67.7	3.8	43.7
Nineteen feet	70.9	4.4	51.3
Twenty feet	90.5	5.2	60.0

The prescribed doses for small trees will be found too small, unless the trees are very low. The calculations are all based upon the supposition that the trees are nearly spherical in shape; but in most cases it will be found that the trees of small dimensions have most of the branches raised fully four or five feet from the ground, thus leaving a large volume on the inside of the tent unoccupied. Due allowance must be made when the height of the tree is so much greater than its diameter.

MODE OF OPERATING.

Place the desired amount of acid in the acid receiver, then put the required amount of soda in a convenient vessel (a gallon measure serves the purpose well), and add water to bring it to a thin paste, stirring well to get rid of all the lumps, before the cyanide solution is added. Mix the cyanide solution and the soda paste so that the undissolved soda will remain evenly distributed through the mixture. Pour into the cyanide receiver and allow it to run slowly and *regularly* upon the acid which has previously been run into the generator. As soon as the cyanide solution begins to enter the generator, the blower should be turned slowly, and continued until all the material is run in and violent action ceased. This usually takes a minute or so after the materials have united. Then follow with violent blowing for a minute or so, and allow to rest until about fifteen minutes from the beginning of the treatment, when violent blowing is repeated for one minute. The time occupied in running in the mixture should be about as follows for the different sized trees:

Ten-foot tree	4 minutes.
Eleven-foot tree	5 minutes.
Twelve-foot tree	5.5 minutes.
Thirteen-foot tree	6 minutes.
Fourteen-foot tree	7 minutes.
Fifteen-foot tree	7.5 minutes.
Sixteen-foot tree	8 minutes.
Seventeen-foot tree	9 minutes.
Eighteen-foot tree	10 minutes.

It is quite important that the *time of injecting shall be closely observed*, and should be lengthened rather than shortened. No time will be saved by hurrying this part of the treatment, for if run in too fast lumps will be formed which will take some time to be completely acted upon by the acid. If the time is slightly lengthened no serious results will follow. Some of the largest doses have been completely acted upon in less than fifteen minutes, thus making it possible for a single generator to serve two tents when the prescribed time of exposure is adopted. It is advisable to continue the treatment of a single tree for about thirty minutes, although the time may be slightly shortened when two tents are used.

This treatment can be used when the temperature does not rise much above 70° F., but when it becomes much higher it will affect the foliage. To avoid this trouble it is suggested to do the work during the cooler portion of the year.

DRY GAS PROCESS.

In Mr. Coquillet's report to Professor Riley, in reviewing the different processes, he favors the method of passing the gas through sulphuric acid, which method he describes as follows, under the name of "The Dry Gas," his idea being that the damage done by hydrocyanic gas, when generated, is due to moisture, which carries particles with it:

I have already alluded above to the fact that the drier the gas the less injurious was the effect upon the tree confined in it, and it occurred to me that the gas might be generated in the usual way, by acting with sulphuric acid upon potassium cyanide dissolved in water, and afterwards be dried by passing it through some medium that would deprive it of its moisture. Knowing the great avidity of sulphuric acid for moisture, I determined to use it as a drier for the gas, and several tests which I have made with this gas dried in this way prove that it does not injure the foliage of orange trees confined in it, while it is just as fatal to the scale insects as is the moist gas. The density of the acid through which the gas had passed was lowered about one degree, as indicated by the hydrometer; but this would not prevent its use for generating the gas.

The cyanide is dissolved by boiling in water for a few minutes, using one gallon of water for each five pounds of cyanide. It is desirable to use as little water as possible for this purpose, but the quantity could not be very much reduced from that given above. I have tried to dissolve five pounds of the cyanide in half a gallon of water, but all of the cyanide had not dissolved after half an hour's boiling. For every ounce of the cyanide solution use half an ounce of sulphuric acid, but it is always desirable to add some of the acid to the prescribed dose, in order that there may be an excess of the acid. No evil results will follow if double the proper quantity of the acid were to be used, whereas, if less than the proper quantity were used, the whole of the gas would not be evolved from the cyanide solution; hence the advisability of always using an excess of the acid.

In generating the gas the acid should flow upon the cyanide solution in a very fine stream. When they come in contact violent action at once takes place, and the gas is rapidly given off in the form of a dense, whitish fog, resembling smoke, and possessing a peculiar odor. When this gas, diluted with air, is inhaled, it produces a dryness in the mouth and throat.

It is impossible to give any definite rule for using the different ingredients that will apply to the differently sized trees, owing to the fact that trees of the same height may have a varying diameter of top; thus orange trees twelve feet tall may have a diameter of top ranging all the way from six to ten feet. The manner in which the tree is pruned will also make a difference in the quantity of the ingredients to be used, some trees being allowed to branch almost from the ground, while others are trimmed up from three to five feet from the ground.

The following table, based upon numerous experiments which I have made on orange trees under a tent ten feet tall, and having a transverse diameter of ten feet, will give a good idea of the proper quantities of each ingredient to be used in treating citrus trees:

Height—In Feet.	Diameter—In Feet.	Cyanide Solution—Fluid Ounces.	Sulphuric Acid—Fluid Ounces.
6	5	2	1½
10	10	12	7
12	8	9	5
16	12	28	16
20	14	47	26

This table is based upon the cubical contents of the space inclosed by the tent, supposing that the lower part of the tent rests upon the ground. No harm will result to the tree if twice the quantity that I have recommended be used, but of course, for the sake of economy, it will be desirable to use only such quantity of each ingredient as will be necessary for destroying the scale insects infesting the tree to be treated with this gas. The sulphuric acid should have a density of 65° when tested with an acid hydrometer; should its density be lower than this, use an extra ounce of the acid for every 5° of density below 65°.

According to Mr. Morse's experiments published in the bulletin, however, it has been proved that the injury to foliage was caused by ammonia, which, especially through the direct influence of sunshine, is evolved from the gas confined in the tent, and Mr. M. suggests, therefore, instead of passing the gas through liquid sulphuric acid, to construct a drier large enough to have it filled with a quantity of pumice stone saturated with sul-

phuric acid. To test this idea on a larger scale, and to also test the practical workings of the Culver tent, I obtained the consent of the commission to have an apparatus made. From Mr. J. P. Culver, of Los Angeles, I obtained permission to make use of his drawings and plans and had a tent constructed according to his idea, with slight modifications, except to size of timbers, frame, etc., which were reduced one half fully, making the whole apparatus so that it could be drawn along on level ground by one horse. The frame and sled on which the tent rests are $5\frac{1}{2} \times 12$ feet, and are made of Oregon pine with runners of oak.

The tent proper consists of two even halves swung on heavy hinges fastened to the mast, and the frame on which the cloth is fastened is made of 2×2 -inch ash. The curved part of the frame or arch is made of 1×2 -inch lapping, and bolted together. Where the two frames meet to close the tent a strip of heavy felting is nailed on it. The tent cloth is made of heavy, fine-woven drill, oiled with linseed oil, and is tacked on the edge of the frame. The mast on which the heavy iron hinges are fastened is made of a 4×4 , but it would be advisable to have this a little heavier, or have it banded with iron. On the top two iron rods with thumb screws and thread in the middle are held in iron hooks. These rods are an essential support for the two wings of the tent when they are swung on the hinges. When a tree is to be treated the frame is drawn closely up to the tree, the mast on line with center of the tree, and the wings are closed. The parts are kept tight together by means of a rope passing through screw-eyes placed alternately on both frames, thus lacing them together after the manner of a shoe. When being drawn from tree to tree the wings of the tent are swung back, the lower end of the frame resting on a scantling, and fastened by means of bolts working in a slot, the frame being braced by ropes, one on each side. In windy weather some difficulty is experienced in handling this, as all other tents. The cloth falls on the ground and laps sufficiently to cover both ends where the two frames meet. On the whole, I believe it the best appliance for covering small and middle-sized trees, but I should not recommend it for trees larger than twelve to fourteen feet. (The frame of the tent I operated with was twelve feet high.) The Titus frame and tent were the ones used by Mr. Morse in his experiments.

THE TITUS FUMIGATOR.

This apparatus was devised by Mr. L. H. Titus, of San Gabriel, and is especially designed for operating on tall trees. It consists of four corner posts, made by bolting together two boards in such a manner that they form a right angle with each other; at the upper ends these posts are connected by cross-pieces, formed of boards bolted together like those forming the corner posts. Two of these cross-pieces are longer than the other two, and are placed on opposite sides of the frame; they are connected near the middle by two cross-pieces, between which is placed the roller upon which the tent is to be wound when being drawn off the tree. These various cross-pieces are braced.

The lower end of each of the rear corner posts is rigidly attached to an axle, on the outer end of which a light wheel is placed, while the inner end is connected with the corner post by an oblique brace. The lower end of each of the front corner posts is attached to the middle of an axle, having a light wheel at each end; the post is attached to the axle by an iron bolt, which permits the wheels to be at the same moment turned, the one forward and the other backward, like the forward wheels of a wagon or buggy. By means of this arrangement the fumigator can be turned about in a circle. The front and rear corner posts on each side of the fumigator are connected with each other by a cross-piece extending from one to the other, and strengthened by braces which extend obliquely from the cross-piece to the posts.

When this fumigator is in use, the front and rear cross-pieces, extending from the posts on the other side to those on the other, are removed, so as to permit the frame to pass either forward or backward over the trees.

The top of the tent is attached by three ropes to the roller, while to the lower edge of the tent are attached four ropes, placed at equal distances from each other; each of these ropes passes through a pulley attached to a frame near each upper corner, and the end of

the rope is attached to the lower edge of the tent, at the place where the opposite end of the same rope is attached. For winding the tent upon a roller an endless rope is used; this passes around a grooved wheel at one end of the roller, and is carried through a pulley near the upper end of one of the rear corner posts; from this point it passes to and around a grooved wheel fastened to the cross-piece near the lower end of this post, and this grooved wheel is operated by a crank.

In taking a tent off of a tree, each of the corner ropes is pulled through its pulley, drawing the bottom of the tent upward, thus turning the tent inside out. After the tent has been drawn up as far as possible, the crank operating the grooved wheel that works the endless rope is turned, winding the tent upon the roller until it has been entirely removed from the tree. The fumigator is thus drawn forward until the tent is brought directly over the second tree, when the ropes attached to the lower edge of the tent are loosened, permitting the tent to drop down over the tree, at the same time unwinding the tent from the roller, and continuing this until the tent rests upon the tree.

THE GENERATOR.

The generator consists of castings and pipes, and was made by Geo. Cumming & Co., but was devised by Mr. Morse.

It consists first of an earthenware jar, which is held firmly by means of a frame, the joint being made tight by means of heavy felting. Through this board two pipes pass connected with receivers, one for the cyanide and one for the acid. When by pouring the acid on the cyanide the gas is given out, it passes onward through a 4-inch pipe which connects with the drier, a large iron* casting 6x18 inches, which is filled with pumice stone moistened with sulphuric acid, and is made so that it can be revolved for the purpose of bringing all particles of the pumice stone in contact with the acid. Through this drier the gas passes onward into pipes which lead into the tent.

Parallel with the pipe, passing toward the drier and connected by an elbow, is a galvanized iron pipe, on top of which is fastened a Cumming fan blower. The blower can be made to act two ways by means of a circular valve, this being moved by a rod. The blower blows forward through the pipe, which meets the gas which has passed through the drier, driving it into the tent. The object of the valve is to prevent the escape of any gas which has not passed through the drier and which might contain ammonia. The suction pipe of the blower passes directly into the tent, and consequently when the gas is in the tent, it is kept circulated when the blower is at work.

The experiments on orange trees ranging from eight to twelve feet high were made during the months of June and July, of 1888, near San Mateo, at the grounds of H. Barroilhet, Esq., who kindly furnished me with assistance in transporting the machinery and putting it up; also in helping to operate the apparatus. Owing to the trees being very near together, it was impossible to use horse power in moving the tent, and this made our progress very slow and tedious. Strong winds interfered also very seriously, tending to make the tent leak. The tests were made during all kinds of weather, from 60° F. to 85° F., calm and windy; and when the drier was well saturated with acid no harm was done to the trees; young fruit, even during a confinement of forty minutes during the noon hour, not being affected. On the other hand, when for the lack of sulphuric acid the drier was not sufficiently charged, serious harm resulted, the foliage in a couple of days falling off. This was especially the case when the operation was done during the middle of the day, but bad effects also resulted when done in the evening as late as seven o'clock, at a temperature of 60°. The effect on the *Icerya*, which were present in immense quantities, was nearly the

* The drier ought to be made of lead if expected to last long.

same when a tree was confined for twenty-five minutes, as when for forty-five minutes, only the bugs themselves and from 50 to 75 per cent of the eggs are killed. That the prevailing wind may have had a good deal to do with my failure of doing better at such times is possible, but I am satisfied, from general results, that when orchards have to be treated on a large scale, it will be found necessary to give two treatments for extermination, and I should recommend, in accordance with this view, that these two treatments be given at four weeks' intervals, which will give an opportunity for remaining eggs to be hatched.

COST OF TREATMENT.

Placing cyanide of potassium at 50 cents a pound and acid at 8 cents, we have the solution of cyanide at a cost of 1 cent per ounce, and acid per ounce $\frac{9}{16}$ of a cent, making it about $27\frac{1}{2}$ cents, for a twelve-foot high tree, for one treatment.

On level ground two men and one horse can handle the tent and treat two trees per hour, allowing twenty-five minutes for the dose to act and five minutes for moving and getting ready.

One horse.....	\$0 50
One man.....	2 00
One man.....	1 50
	<hr/>
	\$4 00

Or an expense of 20 cents per tree.

If two apparatus are used they can be worked with the same force, making the expense but half, or 10 cents apiece when forty trees are being treated once, or for two treatments 20 cents each. To this add the cost of material and it would, for a twelve-foot high tree, be about half a dollar. Besides this there must still be added the price of labor of putting on proper bands. For this purpose sheepskin has been found to be the best; strips four inches wide.

It must, however, be remembered that bands must necessarily be placed on trees that are being sprayed and therefore must not be counted as an expense exclusively attending the gas treatment, being common to both spray and gas process.

GENERAL REMEDIES FOR SCALE INSECTS.

For Scale Insects on Deciduous Trees.

"The wide difference in the atmospheric conditions in the different parts of the State has proved, as might be expected, that different remedies will be found suitable to different localities. When comparing the efficacy of a wash used in one locality with that of another in another locality, we are apt to be misled. Only by trying the same remedy in different localities can definite conclusions be reached. As a general thing, the caustic remedies have been used with good success in the more cool and moist climates of the coast. When well applied, they must be considered among the best and most efficacious we have. On the other hand, they have been generally less successful in the interior of the State, where a dry atmosphere prevails for a longer time.

In using caustic washes, the following points must be especially taken into consideration:

1. Condition of trees.
2. Time of application.
1. Trees must be dormant; otherwise the first buds, especially when advanced, will be damaged.
2. A humid atmosphere, without being actually so as to cause water to run down the trees, is much more preferable than very dry weather; in fact, as was proved last season, actual damage has been done to trees when the wash has been applied during such weather, and the results in killing the scale have also been unsatisfactory under such circumstances.

While we still believe that the caustic, in the proportion given below, when used under

precisely favorable conditions, is as sure and wholesome a remedy as we can apply to apples, pears, and plums, the simple whale oil and sal soda remedy, especially for peaches and cherries, has proved very efficacious; but great care must be exercised in applying it, as the oil is apt to separate, unless well stirred and the compound kept warm.

For Pernicious Scale (Aspidiotus Perniciosus).

For badly infested orchards I recommend: One and one fourth gallons of whale oil, twenty-five pounds of sal soda. Dissolve the sal soda in twenty-five gallons of water, and heat it to boiling. When boiling, pour the whale oil in. Apply the wash when cooled to 130° F. The whale oil forms a kind of emulsion, most of the oil remaining free. After allowing this dose to act for three or four weeks, apply caustic solutions in this proportion:

1 pound of concentrated lye (American), or	80 per cent.
$\frac{1}{2}$ of a pound of powdered caustic soda, or	98 per cent.
1 pound of powdered caustic soda, or	76 per cent.
$1\frac{1}{2}$ pounds of powdered caustic soda, or	63 per cent.

Any one of these to one half pound of commercial potash, at 52 per cent.

To be dissolved in six gallons of water.

MODE OF PREPARING WASHES.

The easiest way of preparing the alkali washes, especially the solid concentrated lye, is by suspending the material in a barrel of water, either putting it on a perforated piece of tin or colander. Being thus suspended, the diffusion is quite rapid, and the material will require but little looking after. By using hot or boiling water, the action, of course, is hastened very much. When dissolved thoroughly, each kind having been kept separately, they are mixed, and stirred well so that they become thoroughly mixed. The liquid should be strained through a fine sieve (brass) or a cloth, so that no clogging is possible when the wash passes through the nozzle.

The San José nozzle has been and is very generally used, but for lye washes, it is, in my opinion, inferior to the Imperial and the Cyclone. The latter has the advantage of throwing the stream better on the underside of branches and foliage. When a pump with two outlets is at work, the two kinds of nozzles may be used to advantage. One man may work principally on the upper part of the tree with the Imperial (because its spray being thrown straight, hits the more vertical branches squarely), while the other man will reach the lower more horizontal branches better with the Cyclone spray, carrying, as it does, either upward or downward.

A very good nozzle is that invented by John Crofton, and sold by H. P. Gregory, and Woodin & Little. It has the advantage of clearing itself by a turn of the bib. Its spray is similar to that of the Cyclone nozzle.

CAUSTICS, OBJECTS OF.

The object to be obtained by using the caustics after the sal soda and whale oil, is to saponify any oil that might have remained on the tree, and which would have a tendency to clog the pores of the bark. We believe this treatment will prove the most efficacious yet recommended.

The cost of whale oil is 30 cents a gallon, in fifty-gallon barrels; 35 cents, in cases. As to caustic, it must be remembered that the price will vary according to quality, and that the purest product is the cheapest. The green bank, 98 per cent, is considered the best and the least varying; next to this, American concentrated lye. Geo. F. Lewes and Menzies & Co. seem to be most reliable.

FOR A LIGHTLY INFESTED ORCHARD.

In the moist coast counties I would recommend the caustic in this proportion, for pears, apples, and plums, the trees to be perfectly dormant:

1 pound of solid concentrated lye (American), or	80 per cent.
$\frac{1}{2}$ of a pound of powdered caustic soda, or	98 per cent.
1 pound of powdered caustic soda, or	76 per cent.
$1\frac{1}{2}$ pounds of powdered caustic soda, or	63 per cent.

Any one of these to one half pound of commercial potash, at 52 per cent.

To be dissolved in four gallons of water; one fourth of a pound of whale-oil soap (80 per cent) to each gallon of mixture.

For peaches and cherries, and in the drier localities, whale oil and sal soda in this proportion:

One gallon of whale oil to twenty-five pounds of sal soda, twenty-five gallons of water. Prepare the same as above.

PREDACEOUS AND PARASITIC INSECTS.

The casual observer who passes over his trees, noting from time to time the appearance and disappearance of insects, does not know how important a role certain insects have upon others keeping them in check and sometimes almost exterminating them.

Among the insects most useful to man in checking and often apparently exterminating some of his insect foes, is the large family of *Coccinellidæ*, or ladybugs. These prey both in the larval and in the mature state. The various species of *Coccinella* and allied genera serve as natural checks on the innumerable *Aphideans*, or plant lice, which infest all our cultivated plants, from grains to fruit trees. The *Coccinellidæ* resemble each other much in appearance in the larval state, although some are hairy, some are smooth.

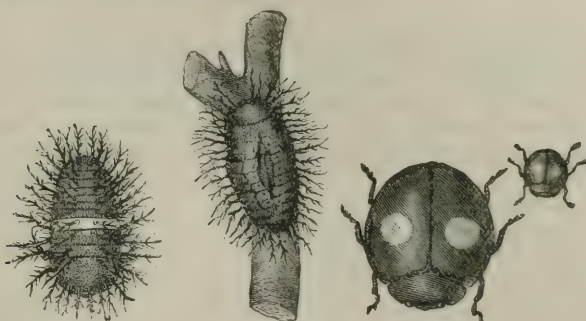


Fig. 9.

Figure 9, *Chilocorus bioulneris*, gives a good idea of these insects in their various stages. When the larva is ready to pupate it attaches itself to a leaf. The mature beetles vary much in size and color, the commonest being red or orange, with black spots. In distinction from the family of leaf beetles, *Chrysomellidæ*, of which the *Diabrotica* is a type, these beetles have only three joints in the toes, while the former have four. The red and orange-colored species seem to confine their attention chiefly to the *Aphideans*. The red-spotted black ones are mostly scale eaters. In California the *Chilocorus bioulneris* has at times proved itself quite valuable in this respect. And from South Africa comes lately the account of the appearance of a species named *Rodolia icerya*, which has proved very useful in preying on the terrible fluted scale.

The *Scymnus marginicollis* is a minute ashy-brown ladybug, which of late has been observed feeding on the eggs of the fluted scale. It is generally a carnivorous feeder, as it has been observed by Mr. D. W. Coquillett feeding on plant lice, and by myself on various scale insects in different sections of the State.

PODABRUS BEETLES.

Often in grain fields, infested with aphis, there will appear black, sticky spots on the leaves of the grain, which denote the presence of these beetles. A little observation will show a slow, flying beetle, hovering about, or crawling on the blades. In shape it is almost linear, from one quarter to one third of an inch in length, with black wing covers, and yellow body and feathery antennæ. This beetle is a voracious feeder, and will destroy an immense number of aphis.

LACE-WINGED FLIES, OR GOLDEN EYES.



Fig. 10.

Of the few insects which have in California been observed preying on the fluted scale, is a species of lace-winged fly, or *Chrysopa*. On the whole, this group is very active in destroying some of our worst pests, including scales and woolly aphids. Figure No. 10 shows the appearance of the larvæ of the insect, and also the peculiar eggs mounted on stalks and often seen on leaves. The mature insect is distinguishable by its large, transparent, very soft, greenish body, large, lustrous eyes—these giving rise to the name of golden eye—and by its slow flight. In South Africa, a species of *Chrysopa* has been very abundant, preying upon *Icerya*.

SYRPHUS FLIES.

As a good check, especially on the troublesome plum aphid, several species of *Syrphus* flies are most important, and fruit growers should make themselves familiar with the appearance of these insects. I cannot do better than refer the reader to our last biennial report, in which an excellent account, taken from Hubbard's "Insects Injurious to the Orange," is printed in full.

SUPPLEMENTAL REPORT ON THE CONDITION OF VARIOUS
FRUIT DISTRICTS.

POMONA.

My visit to this enterprising district, which rightly deserves its name, from the variety of fruits which are grown there successfully, was made last January. In company with two gentlemen well acquainted with this district I spent part of two days looking over this colony. The growth of deciduous trees, especially of apricots, compared very favorably with any other section of the State. A number of prune orchards exist also, which have made a good growth, but it was noticeable here, as in other portions of the State, that the prunes on high ground had already had their rest and were ready to start—in fact many showed green shoots at the tips of the leafless branches. To counteract this influence the matter of irrigation must be strictly attended to, and sufficient moisture should be preserved in the ground, either by careful cultivation, or, if nature does not provide sufficient naturally, irrigation then must be resorted to to fill the want. I do not mean hereby that the ground should be saturated, but sufficient moisture must be preserved in the ground so that continuous growth of the trees is kept up until the nights become sufficiently cool to arrest the growth of the trees. Moreover, I believe lands showing this tendency are better adapted to citrus fruits, in which case, of course, watering cannot be omitted. I failed to see this feature of prunes starting prematurely on deeper moisture, and likewise land more subject to frost. The growing of oranges and lemons is very successful on all the mesa lands, which are composed of a deep, sandy loam well adapted to irrigation, and I saw remarkable proofs of the yield of the latter fruit especially. Thus, Mr. C. E. White told me of the yield of nine bushels of lemons from a single tree. A variety, originally produced in Alameda County by Dr. E. Kimball, is cultivated here, and known as the Alameda seedling; it is considered a good variety.

The deciduous trees cultivated at Pomona comprise almost the whole list, including apples and pears. Among the persons who have devoted considerable attention to experimenting with fruit the Rev. Mr. Loop deserves special credit. Among a large number of apples Mr. Loop has an apple, which he received from the East under the name of the Polo, but according to Professor Budd, of Iowa, an authority on Russian fruits, this is the so called Winter Aport, of East Russia. This apple, Mr. Loop says, has proved better adapted to the climate than any other. It is a bright red colored, white-fleshed apple of medium size, and keeping here till April. It is also a good bearer, at least the tree was loaded at the time of my visit. On Mr. Loop's place are some of the largest and oldest plum trees in Los Angeles County, which had been planted by the early Spanish settlers. Among these is a tree producing a larger olive than the rest, and of the shape of the Mission, but larger. It also ripens two months earlier, and must therefore be considered a most valuable addition to our list of olives. Ten-year old olive trees on Mr. Loop's place have produced as many as thirty-five gallons of berries in the season. The black scale is proving troublesome, and needs here, as everywhere within the influence of the ocean, to be treated.

In some of the deciduous orchards the pernicious scale has not failed to make its appearance, but so far they have not been allowed to spread. The same can be said of the scale insect of the orange family, of which both the *Icerya* and the *Aspidiotus aurantii* have at various times been discovered, but so far have been prevented from spreading by heroic treatment of the trees. How long they can be kept at bay is, however, only a question of time. Unless something more effective is done in San Gabriel Valley to prevent the spread of these two pests, it will not take very long before they will invade the section.

SUCCESSFUL OLIVE GRAFTING.

Mr. C. E. White, who also has taken considerable interest in olives, has grafted over a number of Mission olives, two years ago, to Picholine. The grafting was ordinary top grafting, and was in nearly every case successful, the grafts being now large and in bearing. Most of the scions were not larger than a pencil, and the operation was done in April. I mention this, as it is the first successful grafting of the olive that I have seen performed out of doors in the State: and if, as this case seems to prove, it is a comparatively easy matter, it will be practiced largely in the future.

SAN JOAQUIN COUNTY.

STOCKTON AND IMMEDIATE VICINITY.

The City of Stockton contains a large number of fine shade, ornamental, and fruit trees, including oranges, which, at the time of my visit in November, were full of fruit. In two places, unfortunately, the *Icerya* has been brought on young orange trees from Los Angeles County. Steps were taken immediately to have the trees destroyed, and if the insect has not spread any farther the town may be saved from having its fine gardens infested. By accident I also found in one garden the *red* orange scale, but it seemed only confined to very few trees.

A couple of miles from town is the old nursery of Mr. W. B. West, formerly one of the largest nurseries on the coast. Mr. West has been experimenting considerably with many kinds of trees, and a visit to his place is very interesting. The soil there is a very stiff adobe, and better adapted to pears than anything else; although Mr. West has grown all kinds of trees, he regards the red spider as the most troublesome insect to contend with in the climate, and he has given up the growing of prunes for this reason. Mr. West has cultivated various French walnuts with fair success, although he regards the climate nearer the coast better adapted to it. The soil right here is hardly suited for it either. Of French varieties the Praeparturiens has done the best; the Serotina so far has not borne well. The Bijou has also fruited with him. This latter can hardly be recommended, as it contains but little kernel in proportion to the shell. F. Clows' nursery, farther out, was visited, and found in good condition.

Mr. Clows has been propagating the Bartlett and other varieties on the Japanese Sand pear, which is an exceedingly strong and vigorous stock.

BUDDING ENGLISH WALNUTS ON CALIFORNIA WALNUTS.

Budding of the walnut (*Juglans regia*) on the California walnut (*J. californica*) has, especially in the case of the Praeparturiens, proved successful.

The operation was done very carefully, and nearly all the wood taken out from the bud. Grafting of small trees had also taken very well. I believe this mode of grafting the English walnut on California stock deserves encouragement, as the trees are better adapted to the climate of the interior valley. It seems that the stock in this case governs the growth, and a more moderate and seasonable growth is produced than is the case ordinarily with the English walnut on its own root.

ORCHARDS ON THE CALAVERAS RIVER.

In company with Mr. W. H. Robinson, Quarantine Guardian, and Joe Hale, County Commissioner, I visited the different orchards in this district, especially in the so called Tom Day Settlement. The lands here are chiefly farmed by Italians. The soil is of sandy, sedimentary character, well adapted to many kinds of fruit. The peaches are cultivated chiefly, and do well. Carelessness has allowed the *A. perniciosus* to spread over much of the orchards, and many of them are in a very bad state. All the orchard owners have been notified to disinfect by Mr. Robinson, and I did all in my power to spur them to the necessity of action.

ISLANDS ALONG THE SAN JOAQUIN RIVER.

Passing over Roberts Island, we visited one of the largest and, at one time, one of the finest orchards of the section, the Williams & Bixler orchard. The soil there is generally of good character, except in spots where some alkali is found; some is a reddish alluvial, some a sandy loam. A variety of trees has been planted here, a couple of hundred acres in all—peaches, plums, pears, and cherries. Nearly all are badly infected with scale, and only such as the Black Tartarian cherry shows exemption and healthy growth. This place is also leased to Italians. We saw one of the lessees, who was preparing to do some spraying.

Going around the island we came to a number of smaller orchards lying on the San Joaquin River. The soil here is a deep loam, and the growth of peaches, plums, and pears has been very good. All orchards are affected some, but few, as that of Mr. Hale, being comparatively free. We called at several of the neighbors of Mr. Hale, and found them willing to do something toward exterminating. The general trouble has been that most of the orchards are rented out, and have been allowed to go too far.

COLUSA COUNTY.

In the month of December, a visit to Colusa City and vicinity was made. There are but few old orchards in this locality, and these are found principally on the Sacramento River. Old apple trees here attain large growth, and in some localities the codlin moth does not appear to have shown itself. During the last few years a large number of young orchards have been planted within a few miles of Colusa City. The greater portion of these consist of peaches, Bartlett pears, apricots, and French (petite) prunes. With the exception of some strips of land where alkali prevails, the growth of these young orchards has been excellent, especially of peaches, to which the climate seems well adapted. The people have also good faith in Bartlett pears. The young orchard of Mr. De Jarnatt, a mile and a half northwest from town, is an exceedingly well kept orchard that looks very promising. On the opposite side of the river, Mr. L. F. Moulton has a fine

and well kept orchard principally of apricots and prunes; most of the trees are in their fourth year. Winter irrigation, by flooding from the river, is practiced largely. Some young trees have been badly infested with the pernicious scale, but we believe they have been treated since our visit; and with but little exertion on the part of the growers, this locality could be kept free from this pest. By accident I discovered a few small orange trees which were badly infested with *Icerya purchasi*. Although these insects had been here two seasons, I failed to discover that they had spread to any other trees, and prompt treatment of the trees has therefore prevented their further spread. The trees had been received from a Los Angeles nursery. This is the most northerly point I have found this pest.

In the gardens of Colusa I met with a number of orange trees, some quite full of almost ripe fruit (December 20), but many of the most exposed trees had been severely bitten by the first cold spell of the season. A drive some ten miles up the river brought us to the home ranch of Mr. L. F. Moulton. A large, thrifty looking nursery supplies Mr. Moulton's orchards and the neighborhood. In the garden of Mr. Moulton I saw several fine, healthy looking olive trees which had been full of fruit this season, and which, according to the foreman's statement, had been so for several years. They were a variety of Mission; no trace of black scale could be seen on them. A mile or so from the house, Mr. Moulton has a large, thrifty peach orchard in its third year. In all, this gentleman has some four hundred acres planted on the best of land which can be overflowed at will.

I regret exceedingly that want of time prevented me from going further in this large and productive county, which more than anything else needs population to develop its resources.

Leaving Colusa by stage for Marysville, we pass through the rich, agricultural county of Sutter, where the effect of the frost seemed to have been less severe. Sutter County is steadily enlarging its orchards, and the pack of the Sutter County Cannery has been very fine. The badly infested places near Yuba City have been thoroughly overhauled, and the active interest Mr. H. P. Stabler (who is serving the county gratuitously as Quarantine Guardian) is taking in the condition of orchards throughout the county is showing itself everywhere.

OROVILLE.

A couple of days were spent in this locality, to see the Butte County Citrus Fair, which did honors to the section—both for fine arrangement of the display and the handsome appearance of the fruit.

The seedlings—of which the exhibit chiefly consisted—are of a very high color, and already (in December) the bulk of them was in marketable condition. A few specimens of Washington Navel oranges, from the Thermalito, showed that this orange will here also be one of the most valuable to grow, especially on account of their being early. Several budded varieties were shown by Mr. Wilcox, the agent of the Southern Pacific Company, and the exhibit was indeed very interesting, as proving the adaptability of all the best budded varieties. We learned, however, that the seedling orange withstood the frost far better than any other variety.

THE OLIVE WITHOUT IRRIGATION.

The question whether the olive—which in all the foothills, when watered and uniformly free from the black scale of the Coast Range—could be grown, without irrigation, in the rolling granite and slate lands where a

good rainfall prevails, has been a question in which I have been interested in determining for several years. From what I saw here, I feel confident that whenever a rainfall of twenty-five inches prevails on such land, where the stratum of rocks is vertical or permeable—so that the roots may penetrate freely into the crevices—by good cultivation there will be moisture enough left for the olive to do well, in spite of the long dry and hot season; which, compared with that of the Coast Range, is almost devoid of atmospheric moisture. I visited here the young orchard of Judge Gray, which, when considering the condition it was in last season, has done remarkably well. No irrigation had been given this year, and the trees had made a fine growth. The case, however, in which I was most interested in examining, and which, to me, proved quite conclusive, was that of an olive tree which, after some search, we succeeded in finding on a partly abandoned fruit farm, some six miles east of Oroville, in the hills. The tree had evidently not been cared for for many years, but had bravely held its own, looking as well as could be expected from a tree which had received no care and growing in very hard soil—part of the roots exposed to the weather. I found but little fruit on the tree, but that was sufficient to prove it a Mission. The people living near by had paid no attention to the tree, hence I was unable to learn anything with regard to its yield. In the town of Oroville several large olive trees exist; but, being in gardens, have been irrigated to some extent; and the example I have mentioned is the best I have come across. In connection with the matter of entire freedom from black scale in the foothills, I again call attention to the fact that the Oleander scale (*A. nerii*) will flourish here, and in several instances—as mentioned in previous reports—I have found trees badly infested, half of the fruit being affected to such an extent that it had not ripened. In every case the infection could be traced to oleander trees.

EL DORADO COUNTY.

Having been urgently requested to visit the section of the county of which Diamond Springs and Placerville are the centers, I spent several days of the latter part of the month of March in this vicinity.

In the neighborhood of Shingle Springs, the former terminus of the railroad, but few orchards exist, and none of any consequence are seen before reaching Mud Springs, or, as it is now called, El Dorado.

Many of the orchards and vineyards have been planted on the washed-out mining claims, where the soil is very shallow. The soil is granitic in its character mostly, and, when not washed out, of a red color. Its natural growth is live oak of several kinds, black oak (*Q. kelloggii*), blue oak (*Q. douglasii*), and pine.

The orchards consist chiefly of peaches, apples, and pears. The peach has here suffered from a blight (this blight is not well understood yet, and needs investigation), similar to that found in other portions of the State, but the last two years have been less severe than formerly. The peaches in the vicinity are well thought of by shippers, and sell at fair prices. The Orange Cling and Roseville Cling are among the leading varieties. It had been thought that the orchards about here were badly infested with *Aspidiotus perniciosus*, but this proved a mistake, as I saw only some few trees affected, sufficient, however, to stock the place if not attended to. While here I was shown some black oak trees, which had been grafted with Spanish chestnuts, and had made a fair growth—as much as could be expected without cultivation.

The codlin moth is, in the people's estimation, the worst enemy, and many are despairing of any success of fighting it. No systematic effort has been made, however, to check it, and many of the orchards are badly neglected. This year the arsenic remedies will be tried.

VICINITY OF DIAMOND SPRINGS.

Like the former town, this is an old mining town which has fallen into decay, but through the energies of some few settlers, who have demonstrated fruit culture a success, the county is gradually gaining again. Owing to the codlin moth, many orchards have been grubbed out; yet the quality of the apples here is such that no effort should be spared to check it. It will doubtless always be a hard matter to make the growing of later apples, as they suffer especially from the several broods of moths, which in the dry and warm summer climate are very abundant. By means of thorough treatment, scraping of the bark, and spraying with Paris green, the earlier apples, such as Gravenstein, Alexander, and Astrachan, undoubtedly might be made a success. These varieties would, I think, find a ready market in the Northwestern Territories.

In and about Diamond Springs the pernicious scale has spread to a considerable extent. But few people have done anything to counteract its spread until very lately; however, a change for the better was noticeable, and by considerable exertion it may be prevented from spreading very far. One of the most energetic young fruit growers has accepted the position of Quarantine Guardian, and I believe will do all within his power to awaken people to the necessity of action. I found several persons spraying their trees with caustic soap solution.

The planting of peaches is receiving most attention, but a good many Bartlett pear trees have been set out lately, as the pear is better adapted to the moister land, where the peach is much affected by a gum disease. Nearly all orchards in this vicinity are irrigated, and in many of them red clover is cultivated among the trees—a practice, the benefit of which I question. This growth of course prevents cultivation. Experienced growers contend that on deeper land all kind of fruit trees can be grown without irrigation, and a few orchards seem to demonstrate this.

But few cherries are found here, but according to Mr. W. D. Carpenter, they do well on deep land, bearing well and early. The English walnut is found in some few places, and there are instances of certain trees bearing well—indicating that if the right variety was planted, they would do well and prove profitable. The orchards of the whole region are comparatively small, ranging from a few to twenty or thirty acres, and on the whole do not demonstrate the capabilities of the county. Some few miles from Diamond Springs to the southeast, lies the property of the El Dorado Fruit Company, which is a place worth seeing. The land here is virgin soil, chiefly loose granite varying in tint. In all some two hundred acres are under cultivation, the greater portion of which are in peaches. An orchard of French prunes grafted on peach has borne exceedingly well. This place is a fair representation of what can be done in this section with good management, and reflects credit upon everybody connected with it. The growth of the trees has been good and they appear perfectly healthy.

PLACERVILLE.

This old town is surrounded by orchards, which, as a general thing, are not well cared for. The peach trees which have been planted on the

higher knolls are trained too high, and the trunks being unprotected are riddled with borers; in fact, the latter insect ruins probably two thirds of the young trees of all kinds set out, and until people learn that the first step after setting out young trees is the protection of the trunk in some way, either by shading by shakes on the southwest side or by whitewashing the trunk with something that will reflect the intense heat, this damage must always be expected. In town the *A. perniciosus* is well seated, and the ignorance of people of its bad tendency has allowed it to spread considerably. The codlin moth has discouraged the apple and pear growers, and of late but little has been done to check it. The arsenic spraying is objected to on account of the cultivation of clover for pasture in the orchard. The long distance to market has had a discouraging influence on the fruit growing, but no doubt the opening of the railroad to the place will mark an improvement. I met with but few fig trees in that portion of El Dorado County. From what I could learn and see of its growth its culture deserves encouragement. No doubt with the proper selection of drying varieties, such as the White Adriatic, it would be made profitable. The fig thrives without irrigation I am assured, and could therefore be grown over a much larger area and cheaper than other fruits: The facility for drying in this county is also good—a very essential help toward success.

VACA VALLEY.

During the month of January I again paid a visit to Vaca Valley and adjoining small valleys.

I found that throughout the central part of the valley the pernicious scale has been scattered badly, though the number of trees in any one place was generally but small. Most people were well aware of the danger, and had already taken vigorous hold, while some few were surprised to learn that they were harboring something dangerous. In the matter of remedies I found the recommendations of the Santa Rosa Convention and myself being followed largely. On the road Mr. F. B. McKevitt called my attention to an oak tree suffering badly from the attack of a scale insect which was very difficult to tell from *A. perniciosus*. A microscopic examination of it proved, however, that it was a genuine oak scale. I mention this fact, as it would, of course, be of importance to know if the pernicious scale lived on oak, and if this tree was not the original source whence this bad pest had spread. From this examination I must conclude that there is no connection between the two. The result from the use of strong caustic struck me as a general thing to be unfavorable, the trees in many cases having been burned on the limbs; this had occurred when the solution was used during dry weather. Although these seem to be the general results, a grower, who had given much attention to this matter, and had used caustic potash and soda of the same strength as his neighbors (according to bulletin of last year), has had no reason to regret his work, and on the contrary claims that the trees treated paid better than those trees not treated (which were healthy).

During my stay I visited the old Bassford place, which lies in a little protected nook in the west part of the valley. This place is among the first that send early cherries to the market, and has acquired quite a reputation in this respect. The oldest trees are showing signs of decay and are too close together (being but twelve feet apart) to continue healthy. A number of trees are on Mahaleb root, and have failed to bear for the last few years; they bore well until ten years old. The Mahaleb on its own roots thrives

admirably, and here is the largest tree of the kind I have seen, having at least a spread of branches of fifty feet. The purple Guigne cherry, which is sent from here, was brought from Flushing, New York, originally.

There has been a large number of orchards planted in the valley between Vaca Valley and Suisun. Among the first and best kept here is that of Mrs. Buckingham, consisting largely of peaches, pears, and prunes. The scale is also found in the vicinity, but if well attended to might still be eradicated. Mr. Dickson has an especially fine prune orchard for its age.

ONTARIO.

During the month of February of this year I was enabled for the first time to visit this enterprising settlement, and in company with Mr. E. W. Collins, who is acting as Quarantine Guardian, spent a day looking over the orchards. The colony had, with many portions of Southern California, undergone a very severe windstorm, accompanied with cold, which had ruined much fruit, and in some sections had hurt the young lemon trees severely. The soil, which is chiefly a sandy loam, appears exceedingly well adapted to both the lemon and orange, and many very pretty young orchards heavily laden with fruit (indeed, too heavily for the good of the many trees), some only in the fourth year, could be seen. Among the finest lemon orchards is that of Dr. Chaffey, a brother of the original founder of this colony. The doctor has been experimenting a good deal with the curing of lemons, and claims to have reached good results with what might be termed the wet sand process. He buries the lemons in sandy soil, in trenches thirty inches wide, and twelve inches deep; the lemons are laid close together, and covered with sand; the water is turned on, and the lemons left for five and six weeks. We tasted several lemons cured in this way, which were remarkable for high color and richness in acid. The process has hardly been tried sufficiently to warrant full recommendation, however, and one objection to it seems to be that the fruit, on exposure to dry air, turns speedily very hard. The orchards on the whole are in excellent condition as regards freedom from insect pests; the soft orange scale is found in some places, as is also the black scale, but the latter gains but little headway. Appearance in a couple of places of the red orange scale has been noticed, but the pest has been promptly, and I believe successfully, exterminated. Deciduous trees develop very rapidly here, but are, like the evergreens, irrigated. It was interesting to see the result of an experiment which Mr. C. H. Dwinelle had made on his place, at the head of Euclid Avenue, at an elevation of some two thousand feet. Here we found quite a variety of fruit trees, including apricots, peaches, prunes, apples, and pears, which had grown without irrigation, and compared favorably with trees grown anywhere. The rainfall here, nearer the mountain, I understand, is a good deal more than at a lower elevation, and possibly some seepage from the hills above may help matters, but it nevertheless looks very encouraging. Olives likewise are doing well here, although none I believe have borne well yet. The colony is almost exclusively devoted to the growing of citrus trees.

MISCELLANEOUS.

Considerable attention has lately been drawn to the Myrabolan plum as a grafting stock. While visiting the old Briggs orchard on the Feather River, in Yuba County, my attention was called to a number of apricot

trees which were still vigorous and healthy, although covered over with slickens eighteen inches to two feet deep. Around these were apricots on peach roots, and these were in a state of decay. The case was very striking, and well worth recording.

THE CHESTNUT IN SONOMA COUNTY.

Mr. N. Whittaker has on his place above Bennett Valley, in Sonoma County, several acres of Italian chestnuts, which have done remarkably well. The trees are now in their sixth year, many of them being sixteen to eighteen feet high, the trunk diameter of many of them averaging four inches. Although the growth on the richer and deeper soil is far better than on the shallow and clayey soils, the growth, on the whole, must be considered good, especially as they have received no irrigation. Quite a number of these trees are in bearing this year.

IMPORTED TREES.

Considerable attention has been paid to the importation of orange trees from abroad—both from Japan and Florida. It was ascertained this spring that at least two species of scale insects are often brought from Japan, and that at least two more are found on them quite frequently. One of the kinds most commonly seen is a species of *Lecanium*, or black scale, probably identical with our own. Another is identical with the red scale prevailing at San Gabriel and Marysville, and pictured in my report, Plate II. In view of this fact, and the knowledge that we have received our worst insect enemies from other countries, I have endeavored to have all imported lots showing the least trace of infection thoroughly disinfected. In every case where I have been able, I have examined the imported lots myself, and the Quarantine Guardian appointed for San Francisco has supervised the dipping, and no certificate has been issued before this has been done. In justice to the importers of these trees, I must say that they have all willingly and cheerfully submitted to the necessary disinfection, although the trees in almost every case have been exceptionally clean, and only the most thorough search would reveal any living scale. In this connection, it is proper to call attention to the necessity of most extreme caution in the importation of fruit and ornamental tree cuttings, etc., from abroad and from the Eastern States, and any one receiving anything suspicious is asked to communicate with me. In the matter of olive trees and cuttings from abroad, too much care cannot be exercised, as we are liable to receive from the Mediterranean region more than one pest yet strange to this coast, that might render olive culture unprofitable. In importing prunes, plums, and nectarines, no earth should be allowed to adhere to the roots, lest we might receive the larvæ of the *Curculio*, the pest of these fruits, which is rendering the culture of all the smooth fruits a failure east of the Rockies.

Recognizing the utter impossibility of reaching all the fruit districts which exist throughout this State, and only being able to visit a small portion of their constituents myself, I have, whenever feasible, tried to meet local societies, grangers, etc., and tried to encourage the formation of such. In almost every section where I have traveled, I have been cordially received by fruit growers, and nearly always have found them anxious to remedy evils. Indeed, within the last two years, with cheaper and more successful remedies, a spirit to combat all the insect pests has shown itself. Yet cases where considerable apathy exists are not wanting. What I have said here refers chiefly to the deciduous tree pests. As regards the insects

infesting the evergreens, the case is not so flattering. From the very nature of the trees, the dense mats of foliage almost absolutely prevent total extermination by any wash. The cost of keeping trees clean is much greater than in the case of deciduous trees, and especially with regard to the much dreaded cottony cushion scale, which yields only to the most radical treatment. Partly discouraged from the very difficulty of fighting the insect, and partly tempted by the spirit of speculation so rife in many parts of the State, growers have given up the fight.

Very respectfully submitted.

W. G. KLEE,
Inspector of Fruit Pests.

SAN FRANCISCO, July 2, 1888.

REPORT OF THE COMMISSIONER OF THE SECOND HORTICULTURAL DISTRICT.

To the honorable State Board of Horticulture :

GENTLEMEN: I herewith present a brief report from the Second, or Napa, Horticultural District. The fruit interest of this district has been steadily on the increase, more especially in those parts of the district not heretofore considered as a fruit-growing section. Lands are eagerly sought after by the newcomer that is adapted to fruit growing, and many young and thrifty orchards are being cultivated with care. The new and best varieties of fruits are sought out, with the view of raising the best, and looking to quality instead of quantity. The shipments East speak well for the season—the grape crop in Napa Valley is especially fine this season. The late rains extending so far into the growing season has been of vast benefit to all kinds of products, as well as the fruit crop. The hay crop is extraordinary fine, as that is an indispensable necessity to all other crops, as feed is required for our working stock, without which our lands could not be well tilled. Every orchardist and farmer should lay in a good supply of good hay in due season—a barn well filled with a bountiful supply of provisions for his working stock will insure a good return for his labor. A large supply of feed denotes thrift and good results. By the increase of barnyard manure the land is recuperated, and crops are improved. Of course this is all old advice, but there is a great neglect on the part of fruit growers to save up manure, without which the soil of our orchards will soon become exhausted and the fine fruit will degenerate. Some of our rich and virgin soils have withstood the constant drain on its power to yield heavy crops year after year, but time will tell the effects of land that is neglected to be well manured from time to time. Trenches dug and filled with manure and dirt thrown on top is a good way to recuperate and make productive the orchard, the garden, and farm.

The present season is one that has been most favorable to the fruit growers of this district. There has been but little, if any, frost this season, and all our fruit crops, especially the peach, plum, and apricot, are yielding largely. It is encouraging to the fruit growers to see some enterprise in the way of building fruit driers on a large scale. There is a very extensive building for fruit drying now in process of erection at Napa City, situated immediately on the bank of Napa River, and also near the railroad depot, which gives them superior advantages for shipping or transporting green fruit from other sources. This is a step in the right direction that has long been needed. The vintage of Napa Valley is the best known crop for many years. There was some little scare in the upper part of the valley on account of the appearance of the army worm; but the damage was slight, and the pest soon disappeared, and the vintage of choice wine grapes will be very heavy this season. Much improvement in the way of cellar room and tankage has been made by the wine men of Napa, and producers are expecting a fair and remunerative price for their grapes. The small fruits, such as the blackberry, currant, gooseberry, and raspberry are yielding heavy crops in the Napa Valley. Much attention has been given of late to the cultivation of the English raspberry, which is a very delicious small fruit, and seems peculiarly adapted to the soil and climate of Cali-

fornia, and is made very profitable, as it comes into market at a season when other fruits are green.

I have not the report of the amount of fruit sent East by carloads from the Napa District, but am informed that the number of carloads will far exceed any year before this. Our fruit stands are making a better display of choice fruit for table use than ever before, and what is most gratifying, it is all of home production, and not shipped, as formerly, from other sections of the State. We have about every variety of soil and climate in the Napa District, and by a little attention to the climatic influence, the intelligent fruit grower can best judge what varieties to plant to suit his locality. The codlin moth still abounds, and our apple crop is visibly affected by it, notwithstanding there is much improvement in the apple crop over the last few years. The grafting of new and hardier varieties into the old stock has done much toward eradicating this universal pest. I would recommend to the Board the establishing of an experimental fund, to be placed in the hands of experienced and practical orchardists, for the purpose of defraying the expense of some thorough test of remedies for the codlin moth, and other pests most injurious to our orchards. Other expenses of the Board, heretofore deemed necessary, could now be dispensed with, and the funds used in another direction, by placing it judiciously in the hands of practical men, who will experiment with the same to the advantage of the general public. I do not know of anything to add to the already vast amount of practical information to the fruit grower as published in the various reports issued from the office of the State Board of Horticulture. I have distributed personally a very large number of the reports of 1885, 1886, 1887, and the demand for them far exceeded the amount furnished by the Secretary of the Board, so much so that I had to repeat my demand for copies of the reports several times. They doubtless contain more practical information on all subjects pertaining to horticulture and horticultural interest than any work or report ever published in California, if not of any report issued in any of the States.

I received letters complimentary from some of the visiting members of the "American Horticultural Society," stating that they had not time to read our reports of 1885-86-87 until they had returned home, as most of their time while in California was taken up visiting the various cities, and banqueting and feasting among the fruit growers of our golden State. They were not aware what rapid advances had been made, and what attention had been bestowed on the subject of horticulture in California, until they found time to look over the proceedings of our Fruit Growers Conventions, and the reports of the State Board of Horticulture, published by the Board, with the debates on all questions, and plates illustrating the effects of the pests on our principal fruits: in fact, every subject connected with horticultural *pursuits* has been more fully published by this Board than that of any other State Board of Horticulture.

Respectfully submitted.

W. M. BOGGS.

NAPA CITY, December 4, 1887.

REPORT OF THE SAN JOAQUIN COUNTY HORTICULTURAL COMMISSION.

The fruit industry has received but little attention from the people of San Joaquin County, from the fact that the soil in the days of pioneer farming proved to be so well adapted to the growth of wheat and other cereals—which were more immediately profitable in former years than they are at present—that they preferred the dimes in sight to the dollars of the future. It is true a few small orchards, or scattering trees, were planted near a few of the houses, but they were grossly neglected, left unpruned and uncultivated until they became cumberers of the ground, eyesores to true horticulturists, and allowed to become breeding places for all sorts of fruit pests. Another great drawback existed in the fact that there was no home market, or even a cannery, to utilize the surplus production, and everything had to be shipped to San Francisco. There are, however, many old orchards in different portions of the county which show, by their vigor and productiveness, that fruit also can be successfully grown when a moderate degree of care and attention is given to its culture. People hereabouts are just waking up to the possibilities of their surroundings. All the nursery stock raised in the county is already sold, and local dealers are purchasing all they can obtain within a reasonable distance. Two millions additional could be sold this season if obtainable and known to be free from pests.

No other county in the State can boast such a brilliant prospective future as San Joaquin, or exhibit such a vast body of rich tillable land. It contains about nine hundred and fifty thousand acres, nearly all of which are fenced, cultivated, or improved, with the exception of perhaps one hundred and fifty thousand acres of tule, which will eventually be reclaimed when our increased population shall demand it. This immense body of eight hundred thousand acres is all tillable; there are no huge sterile hills or broad barren plains; hardly an alkali spot of any extent in the whole. Experienced fruit growers from other parts of the State, on seeing such immense areas of land so well adapted to fruit culture, express their wonder at the shortsighted policy of our land owners in using such valuable lands for grain raising; and some of the most prominent and enterprising, among whom may be instanced Hatch, Buck, and Reed, are buying these lands and converting them into nurseries and orchards. One great advantage will be enjoyed by the owners of such nurseries, they will be isolated and can easily be kept free from scale.

Four large rivers—the Mokelumne, Calaveras, Stanislaus, and San Joaquin—with their affluents, traverse our county through its entire length and breadth, thus constituting it the best watered territory in the State. In addition to our natural facilities and advantages, three large ditches, to be used principally for irrigating purposes, are already located and surveyed, and others projected: First, Weller's scheme for bringing in the upper waters of the Mokelumne, which will take time to complete; second, the Lawrence & Byrd ditch, which will be pushed to immediate completion now that a compromise has been effected with the obstructionists; third, the Stanislaus consolidated system recently inaugurated by Shippee and his coadjutors.

On the banks of these streams can be found thousands of acres of fertile alluvial soil suitable to the growth of the peach, apricot, plum, and cherry, also lower and moister land for the blackberry, raspberry, and strawberry. On higher and drier localities the almond, fig, pear, olive, and grape thrive abundantly without irrigation. In fact, there are but few parts of the county where the grape, almond, or olive would be bettered by irrigation. Peaches on the borders of the rivers are superlatively good; pears can be grown almost anywhere, and almonds bear remarkable crops without water. In the foothills grapes and olives bear abundantly where peaches cannot be grown without irrigation. On the Calaveras can be found thousands of acres of the best peach and apricot land in the State, awaiting the advent of enterprising fruit culturists. Plenty of cheap land can be found in the eastern part of the county with a red, gravelly soil, and a climate admirably fitted for the raisin grape; and this eastern belt is also suitable for the orange, if water can be had. These and the sandy loams of the southeastern section are the only lands that suffer for water. The western portion, including the heavy rich soils around Stockton, have proved themselves preëminently adapted to the growth of table grapes; possessing size, flavor, and good keeping qualities; for many years they have been shipped to the East and San Francisco, where they find a ready market. As no irrigation is practiced, or indeed, needed; the cost of working a vineyard in this vicinity is not so great as upon irrigated lands. Walnuts also find great favor among fruit growers; French seedlings have proved the best stock for grafting, though a few are experimenting with the California seedling, but the latter is declared to be difficult to transplant.

A recent inspection of numerous orchards, particularly those operated by citizens of foreign birth, show a reckless disregard of the requirements of successful culture, and a great want of knowledge and skill upon their part. They almost invariably grow cabbages, potatoes, onions, strawberries, etc., between the trees, and the necessity for irrigating a succession of these green crops—for they never allow the ground to lie idle—ruins the trees and injures the quality of the fruit. Their system of high pruning leaves the trunk exposed and invites the attack of borers, which soon destroy the trees. Fruit pests and scale insects in their worst forms and greatest variety infest nearly every section of the county, but energetic and persistent efforts are now making to rid the orchards of them, with strong hopes of ultimate success. My limitation as to space prevents me from dwelling upon this part of the theme, and I leave its further discussion to the State Inspector.

Before closing this report I would have liked, if it had been possible, to furnish the statistics of the shipments of fruit during the past season to San Francisco and the East, but time does not permit, nor can I now find the parties in possession of the figures. It may not be amiss, however, to state the plain, unvarnished fact, that Stockton, at the present time, is the very best location in the State for another cannery. It possesses a vast tributary territory outside of San Joaquin County, abundant fruit, plentiful labor, and unsurpassed facilities for transportation, comprising a short and cheap water route from the city front to San Francisco and the sea, a railroad at her doorstep, and additional competition assured in the near future.

Respectfully submitted.

W. H. ROBINSON, Secretary.

Stockton, December 21, 1887.

SECRETARY'S PORTFOLIO.

REMEDIES FOR THE DESTRUCTION OF INSECT PESTS.

I append hereto a compilation of many remedies in use, in this State, and suggestions thereto, compiled from reports.—[Secretary.]

COTTONY CUSHION SCALE (On Citrus Trees).

Recommended by Professor D. W. COQUILLET, Los Angeles.

While the spraying of trees for the destruction of scale insects has not proved as satisfactory as could be wished, yet when properly done, and an effective wash has been used, it has had the effect of greatly lessening the number of these pests upon the trees thus sprayed; and while there is every reason for believing that the gas treatment will in the main supersede spraying, yet there will always be cases where it will be desirable to use a wash of some kind, such as upon plants or vines trained against a wall, or otherwise so situated that it would be impossible to cover them with a tent prior to fumigating them.

One of the best washes I have used for the destruction of scale insects consists of caustic soda, rosin and water, in the following proportions: Caustic soda, one pound; rosin, ten pounds; water, to make forty gallons.

The caustic soda is first dissolved by boiling in one and a half gallons of water, and when dissolved one half the solution is taken out and the rosin added to that remaining in the kettle. If this precaution is not taken, and the rosin is added to the whole of the soda solution, the latter is very liable to "boil over." After all of the rosin is dissolved add slowly the balance of the soda solution, and boil until the mixture will assimilate with water; this can be ascertained by occasionally dipping out a small quantity of the mixture and adding water to it. When properly cooked it will assimilate with water, like milk, but if it has not been boiled sufficiently it will form a ropy mass in the bottom of the vessel. During the boiling process the solution should be frequently stirred, and if it shows signs of boiling over a small quantity of water should be added, but not too much, or the cooking of the mixture will be delayed. While the mixture is boiling a foam will be formed upon its surface, usually equaling in height the depth of the mixture in the vessel, being composed of very small bubbles. On one occasion, when I was superintending the boiling of some of this mixture, the latter did not form such a foam upon its surface, but in its stead produced very large bubbles; this doubtless resulted from the fact that the mixture did not contain a sufficient quantity of the caustic soda solution to properly saponify the rosin; accordingly I added more of the soda solution, and in a short time the mixture produced the usual foam in small bubbles upon its surface.

When sufficiently cooked that it will assimilate with water, like milk, which it resembles, it should be measured and poured into a barrel or other vessel, and sufficient water added to make forty gallons; the water should be added very slowly, the mixture in the meantime being thoroughly stirred.

The use of the caustic soda is simply to reduce the rosin to a condition which will admit of its being diluted with water, and it does not, therefore, act as an insecticide, its caustic property having been largely, or

wholly, neutralized by the rosin. This wash leaves a sticky residue upon the leaves, giving them the appearance of having been varnished; but in the course of a few days this dries up and is blown off of the leaves, leaving the latter in a clean, healthy condition.

I have used this wash upon orange trees, and have seen it used on other trees, also upon rose bushes, and in neither instance were either the leaves or fruit injured by it, while a large percentage of the *Icerya* were destroyed. It has the property in an eminent degree of saturating the egg-masses, and I have seen numerous instances where these had been saturated and the eggs killed, while females to which they were attached escaped unharmed, and excreted new egg-masses upon the old ones, the new ones being very noticeable by their purer white color. I have never used this wash upon the red scale, but reliable parties who have done so inform me that it proves fatal to a large percentage of these scales.

One thing greatly in favor of this wash is its remarkable cheapness; the materials of which it is composed can be purchased at such a rate that each gallon of the wash will cost only about one half of a cent.

[For gas remedy see essay in proceedings of Santa Barbara Convention.]

BURLAP BANDS.

Hon. L. J. Rose, of Los Angeles, in a recent speech said:

I have learned a habit of this scale bug which is never varied from, and that is, it always goes up and never down.

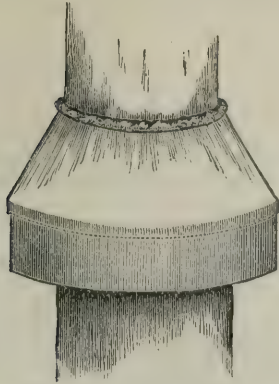
This is valuable knowledge, for we have only to guard for one direction. It may fall off the tree, and they do in thousands, and many will hide and live for a time in the ground, but in the end they find the trunk of the tree and go up again. My cure would be to trim the tree, stripping it of all foliage and small branches, leaving only some of the larger branches, and well cut back at that, then to thoroughly wash the trunk and branches that are left to form another top, with sal soda dissolved in warm water; in fact, care must be taken that no egg or bug escapes, for in this thorough washing success lies, and immediately after washing and before any bug can crawl up, an inverted cone must be tied around the trunk of the tree, so that as they crawl out of the ground up the trunk, they crawl under this cone-shaped bandage, and when they come to the end, they will stop, for their instinct of never going back, answers here a good purpose. As they accumulate they will have to be killed, and if this is carefully attended to for a time, there will be no more in a short time, for they can only live by sucking the sap of the tree. It is easily seen that this is a radical cure if the work is thoroughly done, and if the orchard is not too large it can be done with a comparatively small outlay, except time.

To make these cones various expedients will suggest themselves. Doctor Conger, of Pasadena, says that he can make them by taking old, worn out barley sacks (burlap) and wrapping it around the tree, tying with a fencing rope around the lower portion, then stripping the upper part over this tie, and pulling it out so the lower edge will not touch the tree, say by at least half an inch or more. This will be a convenient material to press against, thus killing the bug, when the edge can be again adjusted by shaping it out away from the trunk. A cone can also be made by taking tarred paper and cutting it in such a way that, when tied, the lower part will stand away from the tree. In that case cotton wool would have to be used to fill up the inequalities of the tree, for there are generally valleys or flute-like gutters in large orange trunks.

A TIN PROTECTOR.

Professor J. A. Lintner, State Entomologist of the State of New York, in his report for 1885, recommends this "tin protector," to prevent the ascent of the canker worm moth. This protector is simple and cheap, and should be tried on citrus trees, to prevent the ascent of the cottony cushion scale. —[Secretary.]

Take a strip of tin, four inches wide, of sufficient length when encircling the tree to leave a space of about six inches. The upper edge of the tin is bent over so as to receive beneath it a piece of muslin as long as the tin, and eight inches wide, to be held in place by pounding down the tin. The ends of the tin are bent in opposite directions, so that they can be



The suspended Tin-band Tree Protector for preventing the ascent of insects.

hooked together. Placing this around the tree with the cloth upward, the cloth is to be firmly bound to the tree by a strong cord. This method is shown in the accompanying illustration. In the above method, the insects, which will collect in large numbers below the obstruction, may be easily killed by brushing them with kerosene oil, without injury to the tree, unless an excessive quantity (a very little is needed) should be used.

SULPHIDE WHALE-OIL SOAP WASH.

Recommended by Professor E. W. HILGARD, State University, Berkeley.

The "whale-oil and sulphur" wash has for some time past enjoyed a good reputation as an insecticide, impaired only by failures due to varying material used. Its effects have, however, been found too weak and transient for many of the hardier pests, and its effects have been strengthened by lye added to the wash. It has been noted at the University that the effects were much enhanced when the wash was boiled after adding the lye, the chemical effect being in that case the formation of sodium sulphide, which acts much more energetically than the sulphur undissolved. To enhance the effect, I prescribed that a certain proportion of lye and sulphur should be boiled together before being added to the soap, the proportion used being three pounds of American concentrated lye boiled with six pounds of sulphur, and then added to a solution of thirty pounds of "Arctic" whale-oil soap, containing twenty per cent of water, to one hundred and fifty gallons of water. This wash worked very well when made up on the spot, and proved effectual against all the kinds of scale found on the University grounds, save the hard, armored individuals.

It was found, however, that when the ingredients were thus prepared and intermixed with a small proportion of water only, for transportation, the soap and the sulphide solution would separate from each other, and unless used subsequently as a whole, successive portions taken from a can would vary in composition, and be either too strong or too weak.

Experiments were, therefore, made to ascertain what proportion of the ingredients must be used to form a mass that would remain solid and uniform during transportation, and after numerous trials the following proportion was found to give the most satisfactory results:

Water	41 parts.
Whale-oil soap (20 water)	45 parts.
Concentrated lye	2.5 parts.
Sulphur	2.5 parts.

The sulphur is first dissolved in the lye by boiling with from four to six quarts of the water, and the whole, with the rest of the water (needed to bring the whole up to about fifty per cent of moisture), is then mixed with the soap. The above amount in pounds would make about two hundred and twenty-five gallons of wash.

The preparation thus made is soft enough to be easily dissolved in water, and remains perfectly uniform under the shaking of transportation. At the same time it is much more effectual than the old mixture containing only undissolved sulphur, and does not affect the leaves, unless while exceedingly tender, in spring. For citrus and other evergreen trees with leathery leaves it may be still farther strengthened by the addition of say a pound of lye per one hundred gallons of wash, after it has been made ready for use in the spray pump.

Recommended by Mr. ALBERT KOEBELE.

One pound of caustic soda is dissolved in one and one half gallons of water; then two pounds of rosin and one pound of tallow are dissolved in one quart of the lye. After the rosin is all well dissolved by moderate heat, the lye is added slowly while cooking under continued stirring; the mixture, if good, will become dark brown and thick. Should it become whitish and flocky (this is caused by too much and too strong lye), water should be added, and it will become right again. This will make twenty-two pints of soap, for water should be added to make that amount, after the lye is in, at a cost of eleven cents, excluding labor and fuel in preparing it, which amounts to but little, and will be sufficient for forty-four gallons of wash sprayed well.

For the Black Scale on Olive Trees.

Recommended by Hon. ELLWOOD COOPER.

Five gallons best kerosene oil, 150° test; one and a fourth pounds good common soap, or one bar and a half of soap usually sold as pound packages; two and a half gallons of water. This makes the emulsion. When using, dilute six and one half (to seven) gallons of water for each gallon of oil, and to this mixture add two and a half pounds of good home-made soap dissolved in boiling water. All this mixing is done with hot water, and is applied at a temperature of 140° F.

For flowering shrubs or garden plants, I would recommend sulphur and lime. Formula: Two pounds sulphur, one pound lime, two gallons water; boil one hour. Dilute one gallon of the mixture with three gallons of water, or more water, according to the strength of the plant.

For the San José Scale.

Recommended by Mr. SOL. RUNYON.

WINTER WASH.

Ingredients for one hundred gallons of solution: Two gallons of fish oil; ten pounds of caustic soda, 98 per cent (dissolved in five gallons of water); five pounds of bluestone.

First—Dissolve the soda and bluestone together in five gallons of water. When dissolved, add the fish oil, and stir until it reaches a boiling point; it can then be reduced with water, and applied, but better results are obtained where it is set aside and not used until the following day; it must be applied warm.

SUMMER WASH.

Ingredients for one barrel of fifty (measure) gallons. Weight, about four hundred and fifty to five hundred pounds.

Ten pounds caustic soda, 98 per cent; ten pounds potash; forty pounds tallow; forty pounds rosin.

First—Dissolve the potash and soda in ten gallons of water. When dissolved, place the whole amount in the barrel to be used.

Second—Dissolve the tallow and rosin together. When dissolved, add the same to the potash and soda in the barrel, and stir well for five minutes or so. Leave standing for about two hours; then fill up with water, stirring well as every bucket of water goes in. Use the following day, one pound to the gallon of water. Apply warm.

Receipt for Making Fish-Oil Soap for Summer Wash.

Ingredients for one barrel of fifty gallons:

Potash	14 pounds.
Caustic soda, 98 per cent.	8 pounds.
Lime, unslacked	5 pounds.
Fish oil, polar or seal	10 pounds.

First dissolve the soda and potash by placing them together in twelve gallons of water. Second, slack the lime in the barrel to be used, in two gallons of water, then add the fish oil to the lime and stir well until the lime and the oil have turned to a thick butter; then add the soda and potash, water boiling hot, and stir well with a dasher for five minutes or more, then leave standing four or six hours; at the end of four or six hours fill up with cold water; do not pour in all the water at once, but about two buckets at a time. Stir well as the first two buckets go in, to prevent lumps. Use the following day. Apply cold, one pound to the gallon of water. In dissolving it do not boil; but weigh the amount to be used, place in a barrel, and on top of it pour hot water, about one bucket to every hundred pounds. After pouring in the hot water stir lively with a dasher until it is entirely dissolved, then reduce, with cold water, sufficiently thin enough to pass through the strainer; then place in the tank and fill up with water, stir well, and it is ready for use.

Salt and Lime Remedy.

Recommended by Mr. I. H. THOMAS.

Twenty-five pounds of lime (unslacked); twenty pounds of sulphur; fifteen pounds of salt; sixty gallons of water.

To mix the above, take ten pounds of lime, twenty pounds of sulphur, and twenty gallons of water. Boil until the sulphur is thoroughly dissolved. Take the remainder—fifteen pounds of lime and fifteen pounds of salt—slack, and add enough of water to make the whole sixty gallons. Strain and spray on the trees milk-warm or warmer. This can be applied when the foliage is off the tree, and will have no injurious effect on the fruit buds or tree whatever.

Recommended by Mr. A. T. COVELL.

Fifty pounds of unslacked lime; twenty pounds of French sulphur; fifteen pounds of salt.

Prepared as follows: Place ten pounds of lime and twenty pounds of sulphur in a heater with twenty gallons of soft water. Boil for half an hour or more, until both lime and sulphur are dissolved. The sulphur must be thoroughly dissolved and mixed with the lime; the mixture will then be of an amber color. Next place in a cask or box forty pounds of good lime and pour upon it enough soft hot water to thoroughly slacken the lime and keep it in a liquid form. After the lime is thoroughly slacked, add fifteen pounds of common stock salt while the material is hot. When the salt is well dissolved mix the two lots together, with sufficient water to make sixty gallons of spraying material, which will then be a thin whitewash. The material should be strained after being thoroughly mixed—a good piece of burlap answering well for the purpose. Apply the mixture with a spray pump, using a rubber plate in the nozzle instead of the brass plate.

RED SCALE ON ORANGE TREES.

Flour Paste Remedy.

The following is the best method of making the paste: Use none but the *best* flour. Calculate one pound of flour to three gallons of water; *sift the flour*. Mix with enough water to make as stiff a paste or dough as possible, and yet have *all* the flour *wet*. Let stand twelve hours or more; then add enough cold water to make a thin paste. Boil the remaining water, and into it slowly pour through a sieve this thin paste, stirring the boiling mixture constantly. It is then ready to use when sufficiently cooled. Sifting the flour has much to do with the non-lumpiness of the paste. For heating the water and making the paste, make an oblong box of one and one fourth by eighteen inch plank, six feet long, making the bottom and ends of sheet iron. Place this box on a little furnace made of stones and mud mortar. Upon two sticks laid on the top of this box (a soap box without top or bottom), with bottom of wire screening, such as is used on screen doors, and then through this box is poured the cold paste into the well stirred boiling water.

OTHER REMEDIES.

For Aphis on Rose Bushes.

Spray with strong tobacco water, but must be washed off in about fifteen minutes after being applied, with cold water.

For Black Smut on Roses.

Colonel Mark L. McDonald recommends equal parts of pulverized sulphur and air-slacked lime, dusted on the foliage.

SAN JOSÉ SCALE.

Recommended by W. G. KLEE, State Inspector of Fruit Pests.

*Winter Wash.**

I recommend two formulas of this kind :

1 lb. of solid concentrated American lye, or.....	80 per cent.	} Any one of these to 1 lb. of commercial potash, 52 per cent.
$\frac{3}{4}$ lb. of powdered caustic soda, or.....	98 per cent.	
1 lb. of powdered caustic soda, or.....	76 per cent.	
1 $\frac{1}{4}$ lbs. of powdered caustic soda, or.....	63 per cent.	

To be dissolved in 2 $\frac{1}{2}$ gallons of water.

*Another Formula.**

1 lb. of solid concentrated lye (American), or.....	80 per cent.	} Any one of these to $\frac{1}{2}$ lb. of commercial potash, at 52 per ct.
$\frac{3}{4}$ lb. of powdered caustic soda, or.....	98 per cent.	
1 lb. of powdered caustic soda, or.....	76 per cent.	
1 $\frac{1}{4}$ lbs. of powdered caustic soda, or.....	63 per cent.	

To be dissolved in 2 gallons of water.

Summer Washes.

Solutions are applied with best result when the majority of the insects are hatched, and persons should watch for this time; the first brood of the San José scale appears generally when the cherries are turning color.

As a general useful wash the sulphide of soda or sulphide of potash, with whale oil, has proved very satisfactory.

1 $\frac{1}{2}$ pounds sulphur.

1 pound of concentrated lye, or powdered caustic soda, $\frac{3}{4}$ pound, or caustic potash, 1 pound.

14 pounds best whale-oil soap (80 per cent soap).

55 gallons of water.

Dissolve the lye in one gallon of water, and boil the sulphur until dissolved. Dissolve the soap in the water; mix the two, and boil them a short time; use at 130° F. in vessel.

This wash is useful not alone against young scale, but against the scab disease of pears and apples; also against leaf-eating insects, as saw-fly larvæ and pear-slug.

Mode of Preparing Washes.

The easiest way to prepare the alkali washes, especially the solid concentrated lye, is by suspending the material in a barrel of water, either putting it on a perforated piece of tin or into a sack. Being thus suspended, the diffusion is quite rapid, and the material will require but little looking after. By using hot or boiling water the action of course is hastened. The liquid should be strained through a fine sieve (brass) or a

*The strength given in both formulas should not be used on any trees after the buds have commenced to swell sensibly, and in almost all sections, except in very late ones, the spraying should be finished by the end of February.

cloth, so that no clogging is possible when the wash passes through the nozzle.

Badly infested trees, when the scales are layers thick, may need two treatments, with an interval of ten days.

COTTONY CUSHION SCALE.

On Deciduous Trees.

Such as locusts, etc.

Use one fourth of a pound of concentrated lye, one fourth of a pound of whale-oil soap, to one gallon of water.

On Evergreens.

The summer wash, I recommended last summer, is useful, and will not hurt healthy foliage:

Dissolve thirty pounds whale-oil soap (80 per cent soap), in sixty gallons of water, by heating the two together thoroughly. Boil three pounds of lye (American concentrated lye) with six pounds of sulphur, and a couple of gallons of water. When thoroughly dissolved, it is a dark brown liquid (chemically, sulphide of soda). Mix the two, the soap and the sulphide of soda, well, and allow them to boil for about half an hour, then add about ninety gallons of water to the mixture, and it is ready for use. Apply it warm at about 130° F. Used warm its effect is better, and less material is required than when cold.

Rosin Solution.

Four pounds of rosin; three pounds of sal soda; water to make thirty-six pints. Dissolve the sal soda in a few pints of water; when thoroughly dissolved add the rosin. Heat until dissolved, and add water finally. Use two quarts of solution to the gallon of water. Use at a temperature of about 100° F.

Rosin and Tallow.

Sixty pounds of rosin; sixty pounds of tallow; ten pounds of potash; dissolved in ten gallons of water; ten pounds of caustic soda (Greenbank, 98 per cent). Dissolve the rosin and tallow; when dissolved, add caustic water slowly. After mixture is made, add ten gallons of water. Use one gallon of mixture to five gallons of water.

Kerosene Emulsion.

Kerosene, 2 gallons, 67 per cent.	} = 33 per cent.
Common, or whale-oil soap, $\frac{1}{2}$ lb.	
Water, 1 gallon.	

Heat the solution of soap, and add it boiling hot to the kerosene. Churn the mixture by means of a force pump and spray nozzle for five or ten minutes. The emulsion, if perfect, forms a cream, which thickens on cooling, and should adhere without oiliness to the surface of glass. Dilute before using one part of the emulsion with nine parts of hot water. The above formula gives three gallons of emulsion, and makes, when diluted, thirty gallons of wash.

NOTE.—It is of the greatest importance that the above mode of preparation is followed strictly, otherwise the result may produce an unstable emulsion, which has all the objectionable features of a mixture of water and kerosene.

Codlin Moth.

The fighting of this insect must be principally done in the spring and summer. The winter work must consist in reducing the hiding places for the cocoons. As these are often found many inches below ground, the soil should be removed and the bark scraped. If the trunk has very rough bark it should also be scraped, and if it is covered with lichens or moss, give it a spraying with a weak lye solution.

The most successful remedy last season proved to be the arsenical mixtures, viz.: Paris Green, London Purple, and White Arsenic. In the coast counties, where more or less damp nights prevail, London Purple and White Arsenic did some damage to the foliage, and for this reason the Paris Green is more preferable; also its effect is most lasting.

Strength to be Used.

For early ripening apples and pears, spray once with one pound of Paris Green to one hundred and eighty gallons of water, when just out of bloom. For fall and winter apples it may be advisable to spray ten days later with an application of one pound to two hundred gallons, while the blossom ends of the apples are still turned upwards. Use the Paris Green without any additions, simply stirring the liquid continually; also, straining it before using. In isolated places, probably one spraying of Paris Green will suffice; however, when the orchard is surrounded with infested orchards not treated, two applications with Paris Green, and followed with sulphide of soda, and soap, seem to be necessary.

Possible Danger of Using the Arsenites.

The greatest care should be taken in handling the arsenic mixture, avoiding getting any in cuts on the hands, also preventing either human beings or animals from eating the young fruit. (Stock should be excluded from the orchard for at least six weeks.) If no application is made after the fruit has commenced to turn downward, there is really no danger to be apprehended; unless, in case of an overdose being used on a tree, and the foliage be affected to such an extent that the leaves will fall, and with them the fruit.

Band System.

As an additional help of decreasing the last broods of codlin moth, the banding system is certainly worth following; but, besides, putting burlap bands around the tree, say one foot from the ground, on larger trees put rags in the crotches, and they should be examined, as well as the bands, once a week.

Woolly Aphis.

Four pounds of rosin; three pounds of sal soda; water to make four and one half gallons. Dissolve the sal soda in a few pints of water; when thoroughly dissolved, add the rosin. Heat until dissolved, and add water finally. Use one and one half pints of solution to the gallon of water. Use at a temperature of about 100° Fahrenheit.

Gas Lime.

On a whole, I have found no remedy as inexpensive and efficacious as gas lime—the refuse of gas works. Outside of its penetrating odor this material has but one objection; it is a strong medicine that must be used with care, and the dose must be regulated somewhat according to the soil and subsoil, and the age of the trees. There is necessarily some difference in its strength, according to its freshness, as it gradually loses some of its ingredients by exposure to the air, and especially to rain. Nevertheless, when applied to a given spot, it will retain its efficacy for at least three years.

Striped Squash Bug.

One tablespoon of saltpeter dissolved in a pail of water; put a pint around each hill of squashes, pumpkins, or melons.

I have tried to ascertain if better remedies are in use in other States and foreign countries. With this view, I have corresponded with people everywhere for nearly a year. The information received I had intended to publish in pamphlet form, but have given up the idea from the fact that very little, if anything, is known of remedies against insect pests outside of the United States. There are more and better remedies in use in this State, than in any other State in the Union, or any country in the world.—[Secretary.]

CORRESPONDENCE.

PARASITES ON THE SAN JOSÉ SCALE AT LOS ANGELES.

SAN GABRIEL, May 6, 1888.

B. M. LELONG, *Esq.*, *Secretary of the State Board of Horticulture:*

DEAR SIR: Mr. J. W. Wolfskill and Mr. Alexander Craw, of Los Angeles, having noticed the progress of the San José scale at Los Angeles, were for a time at a loss to account for its seeming disappearance. A close examination revealed the fact that they were being killed by a minute parasite. Last week Mr. Alexander Craw and myself visited a place on Jefferson Street, in the southern part of the city, where the pear trees were last year very badly infested, some of them having died; now they are looking green and thrifty, and much of the new growth is two feet long.

It is hard to find a living specimen of the scale, and many of the dead scales show little holes in them where the parasites have hatched. Mr. Craw says that the parasite is the same as the one that works on the willow scale.

A. SCOTT CHAPMAN,
State Horticultural Commissioner.

SAN FRANCISCO, November 1, 1887.

B. M. LELONG, *Esq.*, *Secretary State Board of Horticultural Commissioners, San Francisco, Cal.:*

SIR: I beg leave to inform you of the action of our Society at its last meeting, held in San Francisco, October twenty-eighth, to wit:

A resolution was offered by Mr. A. T. Hatch:

Resolved, That the members of the State Horticultural Society acknowledge with sincere thanks the courtesy extended to them by the officers of the State Board of Horticulture, in the welcome to hold their monthly meetings in the elegant and accessible rooms of the Board.

Resolved, That we express our sense of appreciation of the enterprise of the Board in affording not only to our Society, but to horticulturists generally, a headquarters in San Francisco befitting the importance of our great fruit interest, supplied with horticultural literature and museum specimens, and we can but express our belief that providing such facilities for gaining information will be of great permanent value, not only to our own citizens, but to the many desirable people from abroad who are now seeking homes in this State.

This resolution, being duly read, was, upon motion, adopted unanimously.

Yours respectfully,

E. J. WICKSON,
Secretary State Horticultural Society.

SAN FRANCISCO, May 3, 1888.

B. M. LELONG, *Secretary State Board of Horticulture:*

DEAR SIR: I am instructed to notify you that at a meeting held this day a unanimous vote of thanks was tendered you for the very liberal use

of rooms for their meetings, so generously accorded them for many months. Each and every member highly appreciates the courtesies extended.

Respectfully,

MRS. L. E. PRATT,
Secretary Ladies' Silk Culture Society.

WASHINGTON, D. C., May 10, 1888.

B. M. LELONG, *Secretary, 220 Sutter Street, San Francisco:*

DEAR SIR: Your communication of the first instant, containing resolutions of the State Board of Horticulture, is duly received. In reply, I have to say that the documents referred to, under the United States statutes, are to be distributed to the people through their respective Congressmen. If you will be kind enough to furnish me with a list of the citizens of the Fifth District whom you desire to receive the Consular Reports, I will, if possible, fill them all; this being done through the Department, will save postage on the distribution. I can readily understand and appreciate that you have a better knowledge as to those whom this publication would benefit than I have.

Respectfully yours,

C. N. FELTON.

WASHINGTON, D. C., May 14, 1888.

Mr. B. M. LELONG, *Secretary State Board of Horticulture, 220 Sutter Street, San Francisco:*

DEAR SIR: I am directed by Senator Stanford to acknowledge your letter of May second, with resolution adopted by the fruit growers of California, and to say that the same will have his consideration.

Respectfully,

G. FRERE FLINT,
Private Secretary.

WASHINGTON, D. C., July 19, 1888.

Mr. B. M. LELONG, *Secretary State Board of Horticulture, San Francisco, California:*

DEAR SIR: Yours of July twelfth, and the six bound copies of your "Treatise on Citrus Culture," have just been received. I wish to thank you for this favor, and assure you that it is highly appreciated. Before this you have no doubt received the advance copy of the special report which I have just issued on tropical fruits, etc.

I am glad to know that you have in mind to issue a revised edition of your late publication, and if I can be of any use to you in any way I hope you will feel free to call upon me. Your biennial report will no doubt contain a great deal of valuable information.

Very respectfully and fraternally,

H. E. VANDEMAN,
Pomologist.

WASHINGTON, D. C., May 11, 1888.

To the Secretary of the State Board of Horticulture, 220 Sutter Street, San Francisco, California:

DEAR SIR: I am in receipt of your letter of the second instant, transmitting a resolution of the State Board of Horticulture respecting the white scale bug.

I will take pleasure in doing what I can to secure the appropriation mentioned in the resolution.

Very truly yours,

WM. W. MORROW.

WASHINGTON, D. C., July 25, 1888.

Mr. B. M. LELONG, Secretary State Board of Horticulture, San Francisco, California:

SIR: I am in receipt of your request of the eighteenth instant, for a complete set of the Consular Reports.

In reply, I beg to say that these reports are published by the Department of State, and your communication has been referred to that department with favorable indorsement.

Very truly yours,

NORMAN J. COLEMAN,
Commissioner.

WASHINGTON, D. C., July 26, 1888.

Mr. B. M. LELONG, Secretary State Board of Horticulture, 220 Sutter Street, San Francisco, California:

DEAR SIR: Yours of July eighteenth, to Senator Stanford, has been received.

In reply to the same I have to-day mailed you six (6) sacks, containing two hundred and ten copies of the report of the Commissioner of Agriculture for 1887. They are franked so that you can send the same through the mails.

Very respectfully,

JOHN B. MCCARTHY,
Private Secretary.

P. S.—Please acknowledge receipt.

WASHINGTON, D. C., May 9, 1888.

Mr. B. M. LELONG, State Board of Horticulture, 220 Sutter Street, San Francisco, California:

SIR: Yours of May first, to Senator Stanford, has been received.

Senator Stanford to-day requested the State Department to supply you with the Consular Reports, as requested therein.

Respectfully,

J. B. MCCARTHY,
Private Secretary.

SAN GABRIEL, August 11, 1888.

Mr. B. M. LELONG:

DEAR SIR: I have sent in my resignation to the Governor of the State as a member of the State Board of Horticulture. My reasons are that the white seal forbids my being a horticulturist, and ties my purse strings.

I thank you for the uniform courtesy you have always shown me, and hope that the Legislature will appreciate your labors, and grant you further aid.

Very respectfully,

A. SCOTT CHAPMAN.

NAPA CITY, CALIFORNIA, December 8, 1887.

B. M. LELONG, *Esq.*:

DEAR SIR: I find the following paragraph in a daily paper: "Mr. C. H. Dwinelle, now in the town of Fulton, in Sonoma County, says that the olive should not be trained as a tree but rather as a bush with extending limbs, so that the fruit may be gathered by hand without bruising; and this idea with him is not a theory, but his observation of facts in Europe." As to the olive and the manner of pruning that tree, as recommended by Mr. Dwinelle, I shall certainly differ with Mr. Dwinelle's European experience, and would not follow any European practices in regard to pruning or training trees either of the olive or the vine. I will simply say that this method recommended will not be the course that olive growers will pursue in California, and will give my reasons for this opinion further on, which will apply to many varieties of deciduous as well as citrus fruits. The "dwarfing" of trees in California was extensively experimented on in the earlier days of fruit tree planting by men well able to judge of these matters. I should much prefer to follow the advice of such men as Cooper and Pohndorff and Flamant. As regards horticulture and how to enter upon the business of renewing the olive or any other branch of fruit industry, I would never look to a European method or a European for advice how to plant and train trees in California; they will have to come to the California methods of doing this work both in tree culture and viticulture. Our soils are new and not exhausted; our land is not limited to terrace hillsides and rocky flats; there is no scarcity of land; no necessity for crowding our orchards or dwarfing our trees, and also dwarfing our fruits; the larger and more thrifty our trees the better quality will be our fruits, nuts, and oil. As Mr. Block, of Santa Clara, remarked before the Board at our last meeting: "I would prefer the advice and opinion of the American plowboy to one of these foreigners on the cultivation of the soil in America." And as to the matter of gathering the fruit, trust to Yankee ingenuity for the rest. I may continue this subject on the olive question farther, but I do not feel that it is a subject that any mere novice can handle, therefore I shall handle it rather tenderly.

Yours respectfully,

W. M. BOGGS.

NAPA CITY, December 14, 1887.

B. M. LELONG, *Esq.*, *Secretary State Board of Horticulture*:

DEAR SIR: In my last communication—or "report," if you choose—I stated that I would beg leave to differ with the remarks of Mr. Dwinelle, made on the subject of pruning the olive low, so as to enable the producer to pick

the berries off the trees, instead of gathering them in the usual way. I do not pretend to say that my remarks were confined to the olive tree alone—but referred to fruit trees in general. The learned dissertation on the different varieties of the olive—delivered by F. Pohndorff, before the State Horticultural Society, and published in the late biennial report of the State Board of Horticulture—contains a very lengthy description of all the known varieties of that ancient and time-honored fruit; and I will refer the searcher after information on all subjects connected with a choice of varieties, and the kind of soils best adapted to the olives, and the method of planting, to that very valuable memoir on “Olive Culture.” In addition, I would call the attention of those interested in this branch of industry in California, to the work of Hon. Ellwood Cooper, President of the State Board of Horticulture. Mr. Cooper has for many years been extensively engaged in the culture of the olive at Santa Barbara, and also in the manufacture of a superior olive oil, and his experience is invaluable.

There are many reasons why we should seek advice and information on the subject of the growing of fruit in California, from those experienced in California productions, in preference to those practiced in European methods, let them be ever so learned in the ways of their own country. The climate and soils and experiences are so entirely different in this country that a different system seems to be necessary, not only in tree culture, but also in the cultivation and pruning of the vine—at least I am so informed by the most intelligent European cultivators of the soil in California. I have my own experience and opinion on this same subject. I have tried many methods both of pruning and training the vine, and I find none better than that adopted by the “Mission Fathers,” who had been taught by their own dearly bought experience which compelled them to adopt a method best suited to the soil and climate of the locality in which they lived. I have observed many efforts made by our European friends to pursue a different plan, and they universally and invariably fall back on the old California plan. The best vineyards in California to-day are pruned on the same plan as the old “Mission Fathers” used in pruning their vineyards.

But this is diverging from a report on the horticultural prospects of my district. There is much room for improvement in this as well as adjoining districts. Through the indifference of the community, fruit pests have been allowed to increase, so that the subject is now forcing the authorities of our town and county to look more favorably toward adopting other measures for the destruction of these pests than the State law provides. The law has heretofore been utterly ignored, especially in and about Napa City, where *Icerya purchasi*, or fluted scale, has taken possession of all the shade and ornamental trees bordering the streets and lawns of the city. The attention of the public was called to the encroachments of this pest some two years ago, by the distribution of circulars, containing the law on the subject, and notice of the penalty; and also by the appointment of quarantine guardians. But no attention whatever was paid to the frequent notices given in our local papers of the appearance of this worst of all tree pests in the beginning, and finally it has forced its way all over almost every tree, both in public and private grounds, in such prolific quantities as to cause the Board of Supervisors to order the beautiful shade trees in the public square of the County Court House grounds to be destroyed. This doubtless will be followed by an order of the City Trustees, declaring by law that all the trees along walks be cut away. And all this trouble and labor could have been avoided by the destruction of a few worthless acacia trees in front of one man's gate, on a principal street in the town,

from which myriads of this loathsome pest sprang. It is now covering all the locust trees and black walnut trees of twenty and thirty years' growth. If the law had been heeded in the first place, all these beautiful shade trees might have been preserved for years to come.

But this is not all the lost time and valuable labor. These pests will doubtless spread to the adjacent country and attack our young orchards, causing much labor and expense to the owners. It is to be hoped that the destruction of the infested trees in the town and surrounding country will check the spread of these pests; if not, I fear that in another year or two you will have no report from this quarter on fruit culture.

I have no report to make on the amount of fruit shipped from the various orchards and points of shipment in the counties comprising the Second District, other than that the past season was a generally favorable one to the fruit growers of this district. When the report of the recent Convention of Fruit Growers, held at Santa Rosa, is published, it will doubtless give satisfaction and much information on the horticultural prospects of this and adjacent districts, as that Convention was composed of some of the most intelligent and enterprising orchardists from all sections of the State.

I have distributed several hundred copies of the late biennial report of the State Board, and still they are being called for almost daily, which shows that the work of the State Board is very highly appreciated, so much so that the supplies furnished me from the office of the Board have become exhausted, and I find it difficult to retain one copy for my own use.

Very respectfully,

W. M. BOGGS.

ROSTER OF OFFICERS

OF NATIONAL, STATE, AND IMPORTANT HORTICULTURAL AND KINDRED SOCIETIES, FOR THE YEAR 1888.

American Horticultural Society.

Hon. Parker Earle, President.....Cobden, Illinois.
W. H. Ragan, Secretary.....Greencastle, Indiana.

American Pomological Society.

Hon. P. J. Berckmans, President.....Augusta, Georgia.
C. W. Garfield, Secretary.....Grand Rapids, Michigan.

American Forestry Congress.

Hon. G. W. Minier, President.....Minier, Illinois.
B. E. Fernow, Secretary.....Washington, D. C.

American Association of Nurserymen.

Hon. C. L. Watrous, President.....Des Moines, Iowa.
D. Wilmot Scott, Secretary*.....Galena, Illinois.

Society of American Florists.

Robert Craig, President.....Philadelphia, Pennsylvania.
Edwin Lonsdale, Secretary.....Philadelphia, Pennsylvania.

Arkansas State Horticultural Society.

E. F. Babcock, President.....Little Rock.
S. H. Nowlin, Secretary.....Little Rock.

Colorado State Horticultural Society.

E. J. Hubbard, President.....El Moro.
J. M. Clark, Secretary.....Denver.

Colorado State Horticultural and Forestry Association.

A. E. Gibson, President.....Greeley.
Alex. Shaw, Secretary.....Denver.

Florida Fruit Growers Association.

D. Redmond, President.....Jacksonville.
D. H. Elliott, Secretary.....Jacksonville.

Georgia State Horticultural Society.

P. J. Berckmans, President.....Augusta.
T. L. Kinsey, Secretary.....Savannah.

Indiana Horticultural Society.

Allen Fuvuou, President.....Danville.
C. M. Hobbs, Secretary.....Bridgeport.

Illinois State Horticultural Society.

H. M. Dunlap, President.....Savoy.
A. C. Hammond, Secretary.....Warsaw.

Iowa State Horticultural Society.

C. G. Patton, President.....Charles City.
Geo. Van Houton, Secretary.....Lenox.

Kansas State Horticultural Society.

Geo. Y. Johnson, President.....Lawrence.
G. C. Brackett, Secretary.....Lawrence.

* Deceased.

THIRD BIENNIAL REPORT OF THE

Kentucky State Horticultural Society.

A. P. Farnsley, President Louisville.
 William Hanes, Secretary Buchel.

Massachusetts Horticultural Society.

Henry P. Walcott, President Cambridge.
 Robert Manning, Secretary Boston.

Maine State Pomological Society.

Chas. S. Pope, President Manchester.
 D. K. Knowlton, Secretary Augusta.

Minnesota State Horticultural Society.

Wyman Elliott, President Minneapolis.
 S. D. Hillman, Secretary Minneapolis.

Mississippi Horticultural Society.

Dr. H. E. McKay, President Madison Station.
 J. E. Tevoy, Secretary Crystal Springs.

Michigan State Horticultural Society.

T. T. Lyon, President South Haven.
 E. C. Reid, Secretary Alligan.

Missouri State Horticultural Society.

J. C. Evans, President Harlem.
 L. A. Goodman, Secretary Westport.

North Carolina Fruit Growers Association.

J. Van Lindley, President Pomona.
 S. O. Wilson, Secretary Raleigh.

Nebraska Horticultural Society.

Samuel Barnard, President Table Rock.
 J. T. Allen, Secretary Omaha.

Ohio State Horticultural Society.

Hosmer G. Tyron, President Willoughby.
 George W. Campbell, Secretary Delaware.

State Horticultural Association of Pennsylvania.

Calvin Cooper, President Bird-in-Hand.
 E. B. Engle, Secretary Waynesboro.

South Carolina Horticultural Society.

R. M. Sims, President Columbia.
 W. C. Clark, Secretary Columbia.

Texas State Horticultural Society.

T. V. Munson, President Denison.
 Mrs. J. R. Johnson, Secretary Dallas.

Texas State Nurserymen's Association.

E. W. Kirtpatrick, President McKinney.
 J. M. Howell, Secretary Dallas.

Wisconsin State Horticultural Society.

J. M. Smith, President Green Bay.
 B. S. Hoxie, Secretary Evansville.

Green County (Missouri) Horticultural Society.

W. E. Sheffield, President Springfield.
 D. S. Holman, Secretary Springfield.

Holt County (Missouri) Horticultural Society.

N. F. Murry, President Elm Grove.
 W. R. Laughlin, Secretary Elm Grove.

Lafayette County (Missouri) Horticultural Society.

Dr. W. A. Gordon, President Lexington.
 C. Teubner, Secretary Lexington.

Central Missouri Horticultural Society.

H. M. Myers, President Boonville.
 C. C. Bell, Secretary Boonville.

Montgomery County (Missouri) Horticultural Society.

R. H. Mansfield, President Montgomery City.
 F. Lionberger, Secretary New Florence.

Jasper County (Missouri) Horticultural Society.

Bennett Hall, President Carthage.
 Z. T. Russell, Secretary Carthage.

Bates County (Missouri) Horticultural Society.

C. J. Roberts, President Butler.
 Henry Speer, Secretary Butler.

West Tennessee Horticultural Society.

C. M. Merwin, President Medina.
 C. J. Bell, Secretary Kenton.

North Colorado Horticultural Society.

J. S. McClelland, President Fort Collins.
 J. E. Washburn, Secretary Loveland.

Western New York Horticultural Society.

Patrick Barry, President Rochester.
 P. C. Reynolds, Secretary Rochester.

Western Iowa Horticultural Society.

L. A. Williams, President Glenwood.
 George Van Houton, Secretary Lenox.

New Orleans Horticultural Society.

E. Baker, President New Orleans.
 J. H. Menard, Secretary New Orleans.

Horticultural Society of Northern Illinois.

_____, President
 E. W. Graves, Secretary Sandwich.

Horticultural Society of Central Illinois.

C. N. Dennis, President Hamilton.
 A. C. Hammond, Secretary Warsaw.

Alton-Southern Illinois Horticultural Society.

J. S. Browne, President Alton.
 F. C. Riehl, Secretary Alton.

Warsaw (Illinois) Horticultural Society.

H. D. Brown, President Hamilton.
 J. T. Johnson, Secretary Warsaw.

Berks County (Pennsylvania) Horticultural Society.

James McGowan, President Geiger's Mills.
 Cyrus T. Fox, Secretary Reading.

Central Texas Horticultural Society.

Colonel W. G. Veal, President Dallas.
 Mrs. J. R. Johnson, Secretary Dallas.

North Texas Horticultural Society.

T. V. Munson, President Denison.
 J. J. Fairbanks, Secretary Denison.

Monticello (Virginia) Grape and Fruit Growers Association.

Henry L. Lyman, President Charlottesville.
 O. Reiersen, Secretary Charlottesville.

Norfolk (Virginia) Horticultural and Pomological Society.

G. F. B. Leighton, President Norfolk.
 Colonel J. Richard Lewellen, Secretary Norfolk.

Western Michigan Fruit Growers Association.

Walter Phillips, President	Grand Haven.
A. J. Knisley, Secretary	Benton Harbor.

Hennepin County (Minnesota) Horticultural and Gardeners Association.

M. Pearce, President	Minneapolis.
Dr. L. Asire, Secretary	Minneapolis.

Leavenworth County (Kansas) Horticultural Society.

E. J. Holman, President	Leavenworth.
Anna Bowman, Secretary	Leavenworth.

Cowley County (Kansas) Horticultural Society.

J. F. Martin, President	Winfield.
J. Nixon, Secretary	Kellogg.

Southern Ulster County (New York) Horticultural Society.

J. J. Hull, President	Clintondale.
W. C. Caywood, Secretary	Marlboro.

Eastern Cuyahoga (Ohio) Horticultural Society.

E. H. Cushman, President	Euclid.
W. H. Dillie, Secretary	Euclid.

Summit County (Ohio) Horticultural Society.

H. A. Sackett, President	Talamadge.
M. Crawford, Secretary	Cuyahoga Falls.

Montgomery County (Ohio) Horticultural Society.

N. Ohmer, President	Ravenna.
Rev. Andrew Wilson, Secretary	Ravenna.

Lake County (Ohio) Horticultural Society.

W. A. Wheeler, President	Perry.
H. G. Tryon, Secretary	Willoughby.

Columbus (Ohio) Horticultural Society.

J. M. Westwater, President	Columbus.
W. S. Devol, Secretary	Columbus.

Miami County (Ohio) Horticultural Society.

J. P. Johnson, President	Piqua.
W. L. Perry, Secretary	Covington.

Marion County (Indiana) Horticultural Society.

F. Beeler, President	Indianapolis.
Mrs. Chandler, Secretary	Indianapolis.

Wayne County (Indiana) Horticultural Society.

J. C. Stevens, President	Centerville.
J. C. Ratliff, Secretary	Richmond.

Plainfield (Indiana) Horticultural Society.

Daniel Cox, President	Cartersburg.
M. Carter, Secretary	Plainville.

Abbotsford (Quebec) Fruit Growers Association.

Charles Gibb, President	Abbotsford.
George Fisk, Secretary	Abbotsford.

Montreal (Quebec) Horticultural Society.

Professor D. P. Penhallow, President	Montreal.
W. W. Dunlop, Secretary	Montreal.

Nova Scotia Fruit Growers Association.

Henry Chipman, President	Grand Pré, N. S.
C. H. R. Starr, Secretary	Port Williams.

Fruit Growers Association of Ontario.

Alex. McD. Allen, President	Goderich.
L. Woolonton, Secretary	Grimsby.

Southwest Association of Fruit and Vegetable Evaporators.

W. J. Patton, President Fayetteville, Arkansas.
 Dr. J. F. Simonds, Secretary Fayetteville, Arkansas.

Gulf States Fruit Growers Association.

H. W. L. Lewis, President Osyka, Missouri.
 S. M. Wiggins, Secretary New Orleans.

STATE ORGANIZATIONS, 1888.

Alhambra (Los Angeles County) Fruit Growers Society.

A. Phillips, President Alhambra.
 C. T. Adams, Secretary Alhambra.

California State Horticultural Society.

(Meets at the office of the State Board of Horticulture last Friday of each month.)

Prof. E. W. Hilgard, President Berkeley.
 Prof. E. J. Wickson, Secretary Berkeley.

Colusa County Horticultural Society.

L. F. Moulton, President Colusa.
 Frank W. Willis, Secretary Colusa.

Chico (Butte County) Horticultural Society.

E. T. Reynolds, President Chico.
 G. M. Gray, Secretary Chico.

The Horticultural Society of Southern California.

L. M. Holt, President Riverside.
 Wm. H. Holabird, Secretary Claremont.

Los Angeles County Pomological Society.

Thos. A. Garey, President Los Angeles.
 D. Edson Smith, Secretary Santa Ana.

Oroville (Butte County) Horticultural Society.

John C. Gray, President Oroville.
 S. S. Boynton, Secretary Oroville.

San Diego County Horticultural Society.

J. M. Asher, President San Diego.
 Geo. H. Bower, Secretary San Diego.

San Joaquin County Horticultural Society.

Ezra Fiske, President Stockton.
 W. H. Robinson, Secretary Stockton.

Santa Barbara County Horticultural Society.

Prof. H. C. Ford, President Santa Barbara.
 H. K. Bradbury, Secretary Santa Barbara.

Santa Clara County Horticultural Society.

I. A. Wilcox, President Santa Clara.
 H. A. Brainard, Secretary San José.

Sonoma County Horticultural Society.

J. Roberts, President Santa Rosa.
 W. C. Kellogg, Secretary Santa Rosa.

Sutter County Horticultural Society.

B. G. Stabler, President Yuba City.
 H. P. Stabler, Secretary and Entomologist Yuba City.

HORTICULTURAL COMMISSIONS.

Alameda County Horticultural Commission.

A. D. Fryal, President Temescal.
A. P. Crane, Secretary San Lorenzo.

Tulare County Horticultural Commission.

N. W. Mother, President Mussel Slough.
I. H. Thomas, Secretary Visalia.

San Mateo County Horticultural Commission.

Wm. J. McNulty, President Woodside.
Dr. L. D. Morse, Secretary San Mateo.

San Joaquin County Horticultural Commission.

Ezra Fiske, President Stockton.
W. H. Robinson, Secretary Stockton.

Ventura County Horticultural Commission.

M. E. Isham, President San Buenaventura.
N. W. Blanchard, Secretary Santa Paula.

ASSOCIATIONS, ETC.

Anaheim Orange Growers Association.

F. A. Korm, President Anaheim.
E. Browning, Secretary Anaheim.

Ontario Property Owners Association.

D. B. Strobe, President Ontario.
C. D. Adams, Secretary Ontario.

Oroville Citrus Association.

Hon. C. F. Lott, President Oroville.
Geo. W. Harney, Secretary Oroville.

Redding Orange Culture Association.

J. H. Miller, President Redding.
M. D. Redding, Secretary Redding.

Santa Cruz Horticultural Association.

L. K. Baldwin, President Santa Cruz.
Oscar L. Gordon, Secretary Santa Cruz.

Saratoga Village Improvement Association.

Hon. M. H. Myrick, President Saratoga.
Carrie H. Gordon, Secretary Saratoga.

Pacific Coast Nurserymen Association.

James Shinn, President Niles.
R. D. Fox, Secretary San José.

Willows Fruit Growers Association.

T. B. A. Lewis, President San José.
A. E. Winslow, Secretary San José.

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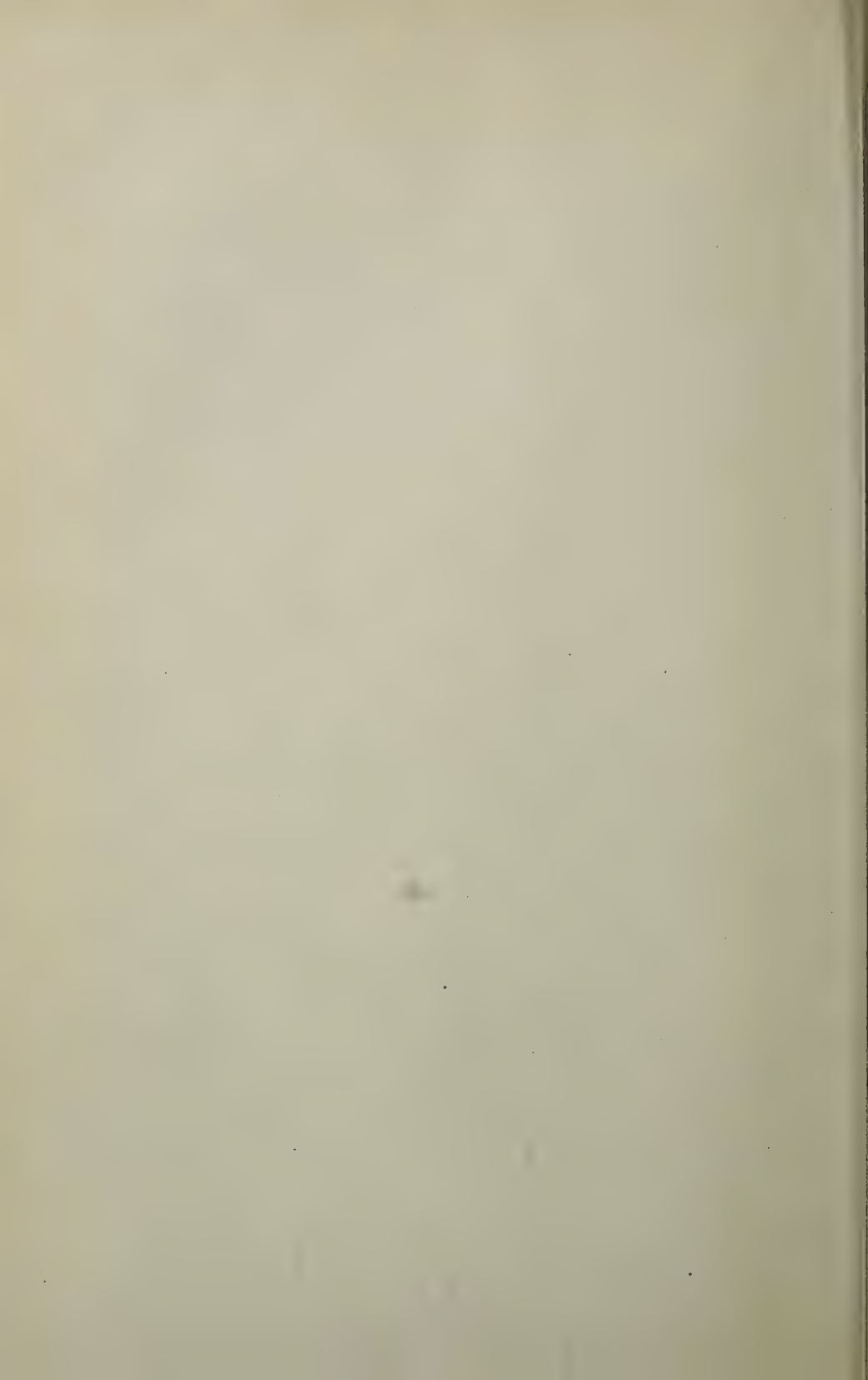
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ANNUAL REPORT

OF THE

Board of State Viticultural Commissioners,

FOR 1887.



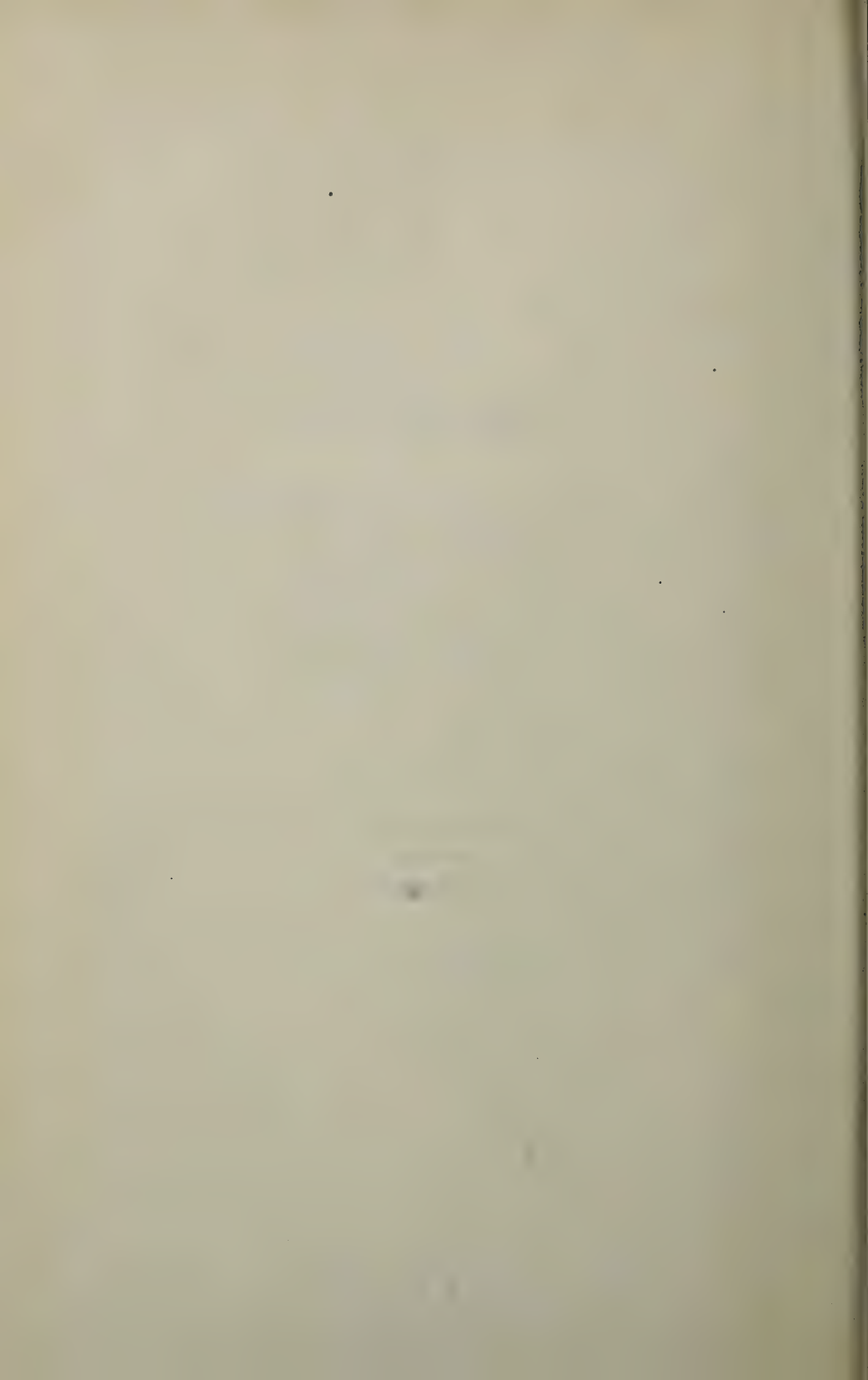
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OFFICERS AND MEMBERS

OF THE

BOARD OF STATE VITICULTURAL COMMISSIONERS.

ARPAD HARASZTHY.....	President,
Commissioner for the State at Large.	
CHARLES A. WETMORE	Vice-President,
Commissioner for the San Francisco District.	
CHARLES KRUG	Treasurer,
Commissioner for the Napa District.	
I. DETURK	Commissioner for the Sonoma District.
W. S. MANLOVE.....	Commissioner for the Sacramento District.
GEORGE WEST	Commissioner for the San Joaquin District.
L. J. ROSE	Commissioner for the Los Angeles District.
G. G. BLANCHARD	Commissioner for the El Dorado District.
J. DEBARTH SHORB	Commissioner for the State at Large.
CLARENCE J. WETMORE.....	Secretary.
JOHN H. WHEELER	Chief Executive Viticultural and Health Officer.

STANDING COMMITTEES:

- Executive*—I. DeTurk, George West, and W. S. Manlove.
- Auditing*—W. S. Manlove.
- Finance*—L. J. Rose and J. DeBarth Shorb.
- On Phylloxera, Vine Pests, and Diseases of the Vine*—I. DeTurk, George West, and W. S. Manlove.
- On Conference with Board of Regents of State University*—Arpad Haraszthy, Charles A. Wetmore, and Charles Krug.
- On Instructions for the Office of the Chief Executive Viticultural Officer*—Arpad Haraszthy, Charles Krug, and I. DeTurk.
- On Distillation, Counterfeits, and Adulterations*—J. DeBarth Shorb, Charles Krug, and George West.
- On Raisins and Table Grapes*—George West, L. J. Rose, and W. S. Manlove.
- On Compensation to be Paid the Chief Executive Officer*—Charles Krug, I. DeTurk, and George West.

Offices of the Board:

204 MONTGOMERY STREET, SAN FRANCISCO.

REPORT

OF

ARPAD HARASZTHY,

President of the California State Board of Viticultural Commissioners.

SAN FRANCISCO, April 12, 1888.

To his Excellency R. W. WATERMAN, Governor of the State of California :

SIR: Herewith you will find transmitted my annual report for 1887-8 as President of the State Board of Viticultural Commissioners, together with other documents necessary thereto.

Owing to your recent succession to the gubernatorial chair through the death of the late Governor Bartlett, it is the first report you will have received from me; and as my term of office expires by limitation on the nineteenth of this month, it will also be the last I will be called upon to make during your administration. In view of these facts, I deem it necessary, for your information, to dwell at some length on the work accomplished for the benefit of the State by this Board. This is the more necessary since, *in certain quarters* there exists, apparently, a *determined ignorance* regarding the work accomplished by this Commission, as well as a *sustained endeavor* to cloud the great actual value of its labors.

Respectfully,

ARPAD HARASZTHY,
President of the California Board of State Viticultural Commissioners.

REPORT.

SIR: The old Mission fathers planted the grapevine in California immediately or shortly after their arrival, previous to 1770. They planted small tracts close around their Missions, guarded them jealously with high adobe walls, cultivated them carefully, gathered their fruit, and made wine. These wines, so far as we can learn, did not enter into the trade of those days, but were consumed by the good fathers, their occasional visitors, and their immediate retainers. Even after the arrival of Americans in 1849, and with them representatives from every civilized nationality on the globe, but little advance was made towards increasing the area of viticulture, until the year 1858, when, through the publication of vine articles in the reports of the State Agricultural Society, and in the newspapers, a general and widespread interest manifested itself in vine planting, and the area of our vineyards became very greatly increased. A very large proportion, however, of these new plantations consisted of table grape producing vines, and the remainder was almost exclusively composed of the old Mission variety.

Towards 1862, vine planting arose to a genuine enthusiasm, and a lively interest was shown in selecting better varieties for the table, for the wine press, and for raisin curing.

Of the three Commissioners appointed by Governor Downey in 1861 "to report upon the best means and ways to promote the improvement and culture of the grapevine in California," Don Juan Warner returned a clear, concise report on the state of vine culture at that period within the limits of our State. On the other hand, the late Agoston Haraszthy went to Europe, and after visiting all its most important viticultural districts, made an elaborate report on the European methods of cultivating the vine, making wine, and curing of raisins, adding practical suggestions to the California vine grower, and at the same time bringing two hundred thousand grapevine cuttings and rooted vines of every attainable variety to be found in Europe, Asia Minor, Persia, and Egypt. These were afterwards gradually distributed in small lots to different parts of the State, and formed invaluable nuclei for experimentation. No report was ever received from the third member of the above Commission.

Towards 1870 the production of wine and table grapes became greater than the demand, and our viticultural industry began to lag, and finally became so discouraging that in 1875 many vineyards were either abandoned, uprooted, or replaced by orchards and grain fields.

In 1879 the demand for table raisins and wine grapes caught up with the supply, and a renewed interest was awakened in viticulture. Our raisins were looked upon with charity in the East, our rich clusters of table grapes admired and sought for, while our wines, though still very crude, had found more numerous and less exacting customers.

Up to 1880 those who believed in the value of varieties of grapes for wine making, other than the old Mission, were few and far between. With the exception of a very limited number of vine growers, none believed any grape could be as good as the Mission, and we have even at this date a Quixotic spirit existing in some parts of our State, still advocating the planting of this very poor, quality-lacking grape.

Experience has shown that it only produced an ordinary, coarse, heavy, flavorless white wine, taking an indefinite period to mature. Such questionable qualities as it may possess in the production of a white wine are more than overbalanced by the miserable red wine made from it. And to this cause, more than any other, I attribute the bad reputation our wines had earned, both here and in the Eastern States, previous to the more general planting of other and finer varieties of grapes.

Many claims have been made by the admirers of the Mission grape, but none have been proven. It bears unevenly, ripens unevenly, and takes upon itself almost every disease that comes along. In this respect we have to congratulate ourselves, for soon the phylloxera and the grafting knife will have rid us of its presence in our vineyards. In point of fact, most of our vineyards are now planted with vines more hardy, resisting disease better, more constant bearers, producing finer qualities and greater quantity than the Mission ever succeeded in doing under the most favorable conditions. Through the persistent efforts of a few enterprising viticulturists, small quantities of wine have been produced from the imported varieties, whose character was so distinctive and so strikingly showed superiority over those made from the Mission, that new faith in the future of California wines was born, and the belief spread that under proper conditions, our State might some day make wine of a superior grade, and eventually rival some of the better wines of European countries.

At the beginning of 1880, our viticultural interests were in a complete state of chaos. In spite of the efforts made by our wine makers and wine merchants, only a limited market had been secured for our wines in the Eastern States, and though the demand showed a steady annual increase, it was at the slowest of rates. Even that small increase, however, was considered gratifying, and hailed as encouraging.

The crop of the year 1879 had been a short one. The old stocks had been exhausted, and suddenly the price of all kinds of wine went up, and the supply was barely sufficient to meet the demand of the market.

This awakened the more general interest of the public in vine planting, but there was a woeful lack of knowledge, a want of system, no beaten paths to follow, and but a few acknowledged authorities to apply to for information. Numerous newspaper articles appeared calling attention to the value of viticulture in our State, and expressing the desire for the formation of some State institution, where such practical knowledge might be obtained as was necessary to the successful conduction of this important branch of agriculture.

Under these influences, soon after, the State Legislature took the matter under advisement, and in March, 1880, the State Board of Viticulture was created, and provided with a modest fund to meet its necessary expenditures.

The numerous duties falling to this Board are fully outlined in the Organic Act, then created and approved April 15, 1880, and enlarged in 1881, and which you will find in our First Annual Report, on pages 5, 6, 7, 8.

Under this Act the State was divided into seven viticultural districts, each having a representative in the Board, appointed by the Governor, and chosen from among men practically conversant with viticulture in its various branches, and recognized in their districts as suitable for the position.

Besides the Commissioners from these seven viticultural districts, there were to be appointed two extra Commissioners to represent the State at large, thus forming a Board consisting of nine Commissioners. The offi-

cers of the Board were to consist of a President, a Vice-President, a Secretary, and a Chief Executive Health Officer. No salary was allowed any of the Commissioners or officers, except the Chief Executive Officer and the Secretary, the rest of the Board serving without compensation.

It was understood that the Governor of the State having the appointment of these men, would choose those who were best adapted to fill the post of honor without regard to social position, creed, or politics, and though the terms of three Governors have ended, this understanding has been honorably maintained up to your administration.

The original appointments were made, and the several commissions signed by the Governor, April 19, 1880, and immediately upon receiving notice to that effect, the Commissioners assembled, organized the Board, and shortly afterward began their labors.

The following list comprises the officers and members of the original Board of State Viticultural Commissioners as above organized:

Arpad Haraszthy, President.....	Commissioner for the San Francisco District.
Chas. A. Wetmore, Vice-President.....	Commissioner for the State at Large.
Chas. Krug, Treasurer.....	Commissioner for the Napa District.
I. DeTurk.....	Commissioner for Sonoma District.
R. B. Blowers.....	Commissioner for Sacramento District.
George West.....	Commissioner for San Joaquin District.
L. J. Rose.....	Commissioner for Los Angeles District.
G. G. Blanchard.....	Commissioner for El Dorado District.
J. DeBarth Shorb.....	Commissioner for State at Large.
Dr. J. I. Bleasdale.....	Secretary.
Chas. A. Wetmore.....	Chief Executive Viticultural and Health Officer.

STANDING COMMITTEES.

Executive—Chas. A. Wetmore, Geo. West, and I. DeTurk.

Auditing—R. B. Blowers.

Finance—L. J. Rose, and J. DeBarth Shorb.

Phylloxera, Vine Pests, and Diseases of the Vine—I. DeTurk, Geo. West, Chas. Krug, R. B. Blowers, and Chas. A. Wetmore.

On Conference with Board of Regents of State University—Arpad Haraszthy, Chas. A. Wetmore, and Chas. Krug.

On Instruction for the office of the Chief Executive Viticultural Officer—Arpad Haraszthy, Chas. Krug, and I. DeTurk.

On Horticulture—Geo. West, R. B. Blowers, and J. DeBarth Shorb.

On Distillation, Counterfeits, and Adulterations—J. DeBarth Shorb, Chas. Krug, and Geo. West.

The following are the only changes that have taken place among the Commissioners and officers of the Board irrespective of the various committees:

In 1881 John H. Wheeler became Secretary, in the place of Dr. J. I. Bleasdale.

In February, 1885, Chas. A. Wetmore was appointed Commissioner for the San Francisco District, vice Arpad Haraszthy, resigned; and on the same date Arpad Haraszthy was appointed Commissioner for the State at large, vice Chas. A. Wetmore, resigned.

In 1887 Chas. A. Wetmore resigned the position of Chief Executive Viticultural Officer, and was succeeded by our Secretary, John H. Wheeler. Clarence J. Wetmore was then appointed to the place of Secretary.

Later on, in 1887, Dr. W. S. Manlove was appointed to the place formerly occupied by R. B. Blowers, representing the Sacramento Viticultural District.

The various committees as then appointed were calculated to cover all ordinary contingencies that might arise, and but few changes have since taken place among them.

There has been no change in the position of President, Vice-President, and Treasurer.

For a better understanding of the important labors undertaken and accomplished by our committees, I refer you to the first annual report of this Board, which you will find herewith transmitted, together with subsequent papers and reports, emanating from the Commission.

The more important labors for the year 1880, as published in the first annual report, were as follows:

First—Identification of the presence and habits of the phylloxera, and experiments made towards discovering a remedy to check its extension, and if possible resist its ravages and exterminate it. With this purpose in view, valuable translations were made from the French and other languages, containing instructions regarding the use of the various supposed phylloxera remedies.

Second—The securing and studying of the supposed phylloxera resisting vines.

Third—The grafting of the superior known varieties upon inferior varieties of vines.

Fourth—Raisin making in Spain, with full and most valuable details.

Fifth—The study of the wild vines of California, and their adaptability for making wine or producing roots to be grafted upon.

Sixth—The study of fertilizers suitable to vineyards.

Seventh—Practical instructions in the planting of new vineyards, and selecting of proper varieties of grapes for table use.

Eighth—Raisin curing, wine making, brandy distillation; I can say with some pride that the work of the year proved to be of the utmost benefit to all classes of vine growers.

The demand was so great among the public for the report of the year, that the complete edition of about three thousand volumes was almost immediately exhausted, and a second edition had to be printed to meet the demand.

The work of this Commission and the method with which it was carried on, was so well appreciated by the succeeding Legislature, that it created a State Board of Horticultural Commissioners, under similar laws as those of this Board, and put the same under the direction of the Viticultural Commission to take charge of, together with the funds appropriated for its maintenance.

This Horticultural Commission was supervised by our Board during the term of two years, and the result of their supervision proved itself satisfactory both to the horticulturists and the public at large. Owing, however, to the additional work thus thrown upon this Board, it appealed to the Legislature to relieve them of the charge and allow the horticulturists to conduct their own Board as they might think best. This was acceded to at the following term of the Legislature.

For the year 1881, I refer you to the printed report, also herewith transmitted, consisting of the reports made by the several Commissioners, together with a report of the Chief Executive Officer.

The latter's report consists mainly of experimental field work, grafting, fertilizing, and observations made on the habits of the phylloxera. Following these papers, come a number of valuable translations made from recognized French authorities, and consist of experiments on submersion and planting the vines in sand as protection against the phylloxera. Various methods of pruning and cultivation of the vine. Characteristics of the principal species of wild vines, studies and observations on the wild vines of America, instruction in the handling of insecticides dangerous to the vine, and reports on the results of the same. Following these comes the

second annual report of the committee on phylloxera, vine pests, and diseases of the vine.

Owing to the demands of an appreciative public, both editions of the above volumes are now completely exhausted.

The third annual report of the Commission is contained in the Second Annual Report of the Chief Executive Viticultural Officer, and covers the years 1882, 1883, and 1884. This volume you will also find in the collection sent you. In this report will be found information of the most valuable kind regarding the developments of our viticultural industry, and the culture of the vine in California. A speculative essay on the varieties of grapes possibly adaptable to our climate and soil. General principles governing the vegetation, pruning, training, and cultivation of the vine, to which are joined elaborate illustrations, showing methods of the different operations. Then follows the ampelography of California. Diseases and pests of the vine, miscellaneous topics, translations, treating of the culture of the vine *en chaintres*, with illustrations, translations showing the culture of the vine in the Gironde; and finally, translations describing and illustrating the various methods of grafting.

This volume is one of the most useful practical viticultural books that has ever been printed in the English language.

In the year 1882 the Commission inaugurated the first Viticultural Convention, and this proved to be the most effective method of gathering and disseminating just such knowledge as was required by the neophyte in vine planting, raisin curing, and wine making.

Many valuable papers were read at the Convention, and a large number of wine samples, raisins, wine and table grapes were exhibited and reported upon by duly appointed and thoroughly competent committees. The result proved itself of the most satisfactory nature, but owing to a lack of funds in the State Printing Office, the proceedings of that Convention were only published through the enterprise of the owners of the "San Francisco Merchant," and through that medium became distributed throughout the State.

In the following year a District Viticultural Convention was held at Los Angeles, which resulted in producing a marked improvement in the manufacture of wines in that district, through the introduction of varieties of grapes hitherto almost unknown in that section.

During the same year the Second Annual Viticultural State Convention was held in this city, under an increased interest among the public and the vine growers generally. Papers of value were read, discussions entered into, grapes, raisins, wine, and brandies were exhibited, submitted to competent committees, and faithfully reported upon.

Again, owing to a lack of funds in the State Printer's Department, the proceedings of that Convention had to be turned over to private enterprise, and the "San Francisco Merchant" took charge of the same, publishing the proceedings in its columns.

In the year 1884 a District Viticultural Convention was held in Fresno, and raisin curing was given the post of honor. Then came irrigation, drainage, proper varieties of grapes, insecticides, and the making and storage of wine in hot climates. A marked interest was shown in the topics under consideration, and much practical knowledge acquired. The proceedings were again published in the "San Francisco Merchant," for reasons already mentioned.

In the same year the Third Annual Viticultural Convention was held in this city, similar in tenor to those previously held; and you will find joined herewith a full report of that Convention, which was also printed in the "San Francisco Merchant," for want of an adequate appropriation

in the State Printer's office. At that Convention about four hundred samples of wines and brandy were exhibited, coming from nearly every wine district in the State, besides many samples of raisins and table grapes.

The Fourth State Viticultural Convention was also held in this city, and likewise published in the "San Francisco Merchant," for want of funds.

In 1886, our funds having been exhausted in our endeavor to pass a National Pure Wine Bill, the conduction of our Convention was turned over to the Grape Growers and Wine Makers' Association, and held in this city under their auspices, in March, 1887. A copy of the proceedings you will find transmitted with this report.

The Sixth Annual Convention was held in the beginning of March of this year, and, if possible, proved itself even more popular and more satisfactory than any of its predecessors, there being a larger attendance and a larger number of wine and brandy samples exhibited, thus clearly proving the recognized value of these Conventions, and their growing appreciation by the vine growers at large; and I may here state I know of nothing so conducive towards the rapid improvement in quality of our viticultural productions as the holding of such Conventions, the reading of papers from practical and experienced men, and a considerate discussion of the merits of the subjects presented. At all Conventions more or less machinery and viticultural implements have been exhibited, and closer attention drawn to the value of numerous new methods and new appliances for the pressing of wine, the crushing of grapes, the grafting of vines, the tilling of the soil, and devices for perfecting the packing of raisins.

Reports of the various committees on wines tasted during the last Convention, were unanimous in the acknowledgment of their marked improvement in quality over those of previous years, attributing the improvement not only to the better management in the fermentation of the wines, but likewise to the greater knowledge attained in the selection of proper varieties of grapes for certain localities, planted with due regard to exposure, soil, and climate.

To further demonstrate the extent of the work accomplished by the Commission, I herewith add a hurriedly collected index of original papers, written on various viticultural subjects, by the officers and members of this Board, as well as those written by others, at the solicitation of the Commission, and have indicated where these papers were printed and can be found. It is with a sense of pride that I point to these practical papers on the various branches of viticulture, and invite any other wine country to show a single one of its institutions that has accomplished more in the same period of time.

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PROGRAMME OF SIXTH ANNUAL VITICULTURAL CONVENTION, MARCH 7, 8, 9, AND 10, 1888.

The following list of speakers read original papers in the order mentioned:

- Arpad Haraszthy, President of the Board of State Viticultural Commissioners: Opening Address (Annual)—"Past, Present, and Future of our Viticultural Industries."
- T. C. White, Fresno: "Raisins—Drying, Packing, and Preparing for Market."
- Dr. W. S. Manlove, Viticultural Commissioner for the Sacramento District: "Table Grapes."
- R. J. Harrison, San Francisco: "Wine Storage and the Preserving of Fruits in Cold Storage."
- Leonard Coats, Napa: "Best and Cheapest Methods of Obtaining a Grafted Vineyard on Resistant Stocks."
- C. J. Wetmore, Secretary of the Board of Viticultural Commissioners: "The Chaintre System of Pruning and Conducting the Vine in California."
- H. W. McIntyre, President of the Vine Growers and Wine Makers' Association: "Distillation of Grape Brandy—How to Establish and Conduct a Distillery."
- Frank West, Stockton: "Wine Cellars for the Interior Valleys."
- Dr. John A. Stewart, Santa Cruz: "Maturing Wines."
- H. A. Merriam, Los Gatos: "Wine and Brandy Making as a Profession."
- Professor W. B. Rising, State Analyst and Professor of Chemistry at University of California: "Sophistication of Wines."
- E. H. Rixford, Secretary of the Vine Growers and Wine Makers' Association: "Sherry Flavor in Wines."
- J. H. Wheeler, Chief Executive Viticultural Officer: "Some Pests and Diseases of the Vine, with Remedies."
- J. L. Heald, Crockett, Contra Costa County: "Wine-Making Machinery."
- H. A. Pellet, St. Helena: "Fermentation."
- J. P. Smith, Livermore: "Our Markets for Wine."
- F. T. Eisen, Fresno: "How to Conduct Fermentation in Fresno County."
- Professor E. W. Hilgard, Professor of Agriculture at University of California: "Results of Experimental Fermentations made in 1887."
- Charles A. Wetmore, Vice-President Board of State Viticultural Commissioners: "Practical Temperance Reform."
- Arpad Haraszthy, President of the Board of State Viticultural Commissioners: "How to Drink Wine."
- F. Pohndorff, Mission San José: "Wine as a Temperance Agent."

The above list or index is far from complete of the work accomplished or inaugurated by the Commission—many valuable papers having appeared in the daily newspapers, that my limited time will not permit of finding.

At the time of the organization of the Viticultural Commission it was estimated that there were thirty-five thousand acres of vines planted in the State. I am inclined to accept these figures as correct. Of this amount there may have been planted as much as 20 per cent with imported varieties, and the balance with Mission grapes.

At the present date, after eight years existence of the Viticultural Commission, it is believed that there are planted not less than one hundred and fifty thousand acres in vines, and fully 90 per cent of these are reckoned as consisting of the finer grades of foreign wine grape varieties, mainly drawn from France, Spain, Portugal, Italy, Germany, and Hungary. The result of the planting of these fine grade grapevines, has been the producing of wines of much better quality than had been hitherto produced, creating a revolution in favor of California wines and the conquest of markets that even the most sanguine among us never hoped to acquire.

From the very beginning the Commission, recognizing the value of correct statistics, endeavored to collect such as might show the true condition of the viticulture of our State, and, with this purpose in view, circulars

were sent out to all parts of the State, asking for detailed information on the number of vines planted in each district and locality; the age and varieties of vines planted; the number, names, and post office addresses of the various vine growers of the different districts, and other matters of public interest and value.

Though this work was entered upon with zeal and prosecuted vigorously, it met with only a partial success, owing to the many unreliable statements received from some quarters, and the general unwillingness to give any such information, by those interested. In spite of these difficulties, however, the Commission has finally been able to secure the names and addresses of about six thousand viticulturists.

The same work had been attempted by a number of people interested in vine growing, and quite recently again by the San Francisco Wine Dealers' Association, but each effort proved abortive. Nevertheless very close estimates have been made, or at least estimates that are accepted as close, and with these in mind we can consider some of the points bearing on the present and possibly the future of this industry in our State. And, at the same time, we can note the actual progress made in the sale of our wines at home and abroad, together with the prices ruling and total estimated values.

To begin, I will assume that there are now planted in California one hundred and fifty thousand acres of vines, which will all be in full bearing within three years hence. Allowing these an average value of \$300 per acre, without other improvements, we will have a valuation of \$45,000,000. Of course, there are vineyards not worth \$2 per acre, but these are few in number, and either planted with the Mission, or some other equally common varieties of grapes. On the other hand, many of our vineyards are worth considerably more than \$300 per acre, which difference would more than balance the discrepancy of the above estimates. I reckon the value of the improvements necessary to carry on the vineyard business successfully at \$20,000,000. These improvements consist of fences, houses, barns, cellars, presses, tanks, casks, distilleries, agricultural implements and machinery, live stock, etc. The two estimates thus made would place the present capital invested in viticulture in California at \$65,000,000. Comparing the present valuation with that existing previous to the creation of the State Board of Viticulture, we are confronted with the following interesting results: Thirty-five thousand acres in vines, of which 80 per cent were Mission grapes, at \$300 per acre, gives \$10,500,000; proportionate other improvements necessary to carry on the vineyards, etc., \$4,000,000; total investment, \$14,500,000.

This shows a direct increase of \$50,500,000 in the viticultural investments within the last eight years, and of course yielding a proportionate greater income by taxation to the State through the enhanced value of vineyard and contiguous lands. And we might smilingly say to the State of California that it has reaped, and will continue to reap, a very handsome income from the paltry sums given to support this Board of Viticulture. We may doubt whether any private investment has ever secured such golden returns, always, of course, excepting the railroads and other transportation companies.

Within the past few years, owing to many contingencies, the production of our vineyards have not kept pace with the number of vines planted in point of quantity. These differences are caused sometimes by fall or spring frosts, or by both; sometimes by strong winds sweeping over the vineyards while the vines are in bloom; then by sunburn, and other times by the visitation of peronospera, or kindred fungoid diseases. Even the grasshopper has had his sway, and with him various other bugs, worms, and moths.

Bearing in mind the rapid increase in acreage of vines from year to year, since 1877, we will be somewhat surprised to note the differences in the amounts of wine produced as shown by the following figures:

Vintage.	Gallons New Wine.
1877	4,000,000
1878	5,000,000
1879	7,000,000
1880	10,200,000
1881	8,000,000
1882	9,000,000
1883	8,500,000
1884	10,000,000
1885	11,000,000
1886	18,000,000
1887	15,000,000

From the number of vines coming into bearing we should have produced not less than twenty million gallons in 1886, and twenty-five million gallons in 1887. In alluding to the above estimates as wine, I desire it understood that they are reckoned at the first racking of the newly fermented juice only. When the wine will have become one year old, and fit for removal by the trade, the above quantities will have very greatly diminished through natural shrinkage and accidental losses. Much of it will have spoiled, and only fit to be used for making vinegar or brandy.

Considerable quantities of wine are annually made in this city by the Italian, French, Spanish, and Portuguese population, and either consumed in their own households, or sold in a small way to their neighbors and friends. Large quantities of grapes shipped to San Francisco are thus done away with, and, at the beginning of the season, usually realize quite good prices.

It is difficult to form a close estimate of the wine yearly consumed on this coast. I am led to believe that not less than two million gallons are used in San Francisco and Oakland, and about three million gallons more in the interior of the State, in Arizona, Oregon, Washington Territory, Nevada, and Utah. The amount exported to the Eastern States and foreign countries in 1887, reached seven million gallons more, giving a total demand for the year of twelve million gallons.

Reckoning in the sweet together with the dry wines, this would give an approximate value of \$4,500,000, and the brandy used on this coast, if exported, would swell the amount about \$1,000,000 more, giving a consumption equal to \$5,500,000.

And right here it may be well to draw your attention to the possible value of the productions of our vineyards within the next three years. Assuming that our one hundred and fifty thousand acres will be in full bearing at the end of that time, that fifteen thousand acres of these are planted for raisins, and ten thousand for raising table grapes, we have left one hundred and twenty-five thousand acres for wine and brandy making. These figures will yield us a possible one and a half million boxes of raisins; forty thousand tons of table grapes for export and home consumption; fifty million gallons of wine, and one and a half million gallons of brandy. I value these as follows; new and in producer's hands:

1,500,000 boxes raisins at \$2	\$3,000,000
40,000 tons table grapes at \$30	1,200,000
50,000,000 gallons wine at 20 cents	10,000,000
1,500,000 gallons tax paid brandy at \$1 40	2,100,000
Total	\$16,300,000

It seems to me, as it must likewise seem to you, that the State is doing well to foster an enterprise that can bring such returns, the more so since the greater part of these productions will be sold abroad, and in return bring its harvest of gold to enrich our citizens, encourage labor, and create prosperity.

The prices paid for wines during the past year ranged most discouragingly low. There seemed to be a regular stampede among producers, and a corresponding fear among the merchants, that the prospective vintage of 1887 would turn out enormously large.

This presumption, however, not being realized, prices have taken an upward road, and while wines of 1886 could have readily been bought at from 13 to 14 cents per gallon in August last, all such stock has been exhausted, and the new wines of 1887 now readily command from 17 to 20 cents for the ordinary qualities, and notably higher for the finer grades.

The following are the average prices paid per ton, during the vintage of 1887, for the more prominent varieties of wine grapes:

Cabernet.....	\$25 to \$30
Petit Pinot	25 to 30
Black Burgundy.....	18 to 20
Meunier	18 to 20
Riesling	18 to 20
Mataro	16 to 18
Zinfandel	14 to 16
Carbone	13 to 15
Malvoise.....	8 to 9
Mission.....	7 to 8

It is of course understood that these prices varied in different localities, conforming to the universal rule of supply and demand. It is a matter of fact as well as one for congratulation, that the reputation of our wines is favorably increasing, both among ourselves and among the wine drinkers in other countries. This is owing chiefly to the laudable ambition of our wine makers not only to increase their knowledge in the modes of fermentation, but also to their persistent efforts to secure better quality, through the planting of vines better adapted to their locality, and selecting the finer varieties of grapes even at the expense of quantity. To continue in that direction will, in the near future, find us markets for any surplus we may have, in Asia, South America, and even in Europe; and were the Americans but wine drinkers at home, as they ought to be for their own good and the cause of true temperance, there would soon be no surplus at all.

Our increasing shipments of both wine and brandy out of the State, by rail and sea, are shown to considerable advantage by the following statistical tables that I have compiled from the most authentic sources, and, after verification, arranged to give a clear, comprehensive insight to the importance of this branch of trade.

Receipts of California Wine and Brandy at San Francisco from the Interior.

YEARS.	Wine, Gallons.	Brandy, Gallons.
1875	1,995,629	52,036
1876	1,697,590	60,527
1877	2,336,653	126,324
1878	2,983,136	103,772
1879	3,364,607	93,506
1880	3,759,743	133,764
1881	4,937,876	157,083
1882	4,452,386	136,883
1883	4,838,623	131,711
1884	4,858,458	112,265
1885	5,895,100	157,752
1886	6,209,131	180,324
1887	8,496,344	256,104
Total	55,825,276	1,702,051

The increase from 1875 to 1887 was 425 per cent for wine, and 492 per cent for brandy.

The noticeable fluctuations in the amounts of brandy received, were caused by the greater or less price that wine could command, quite as much as to the scantiness or abundance of the vintage.

Total Wine Shipments out of the State, with Declared Values and Computed Average Value per Gallon.

YEARS.	By Sea, Gallons.	By Rail, Gallons.	Total Gallons.	Total Values.	Average Price, Cents.
1875	507,809	523,698	1,031,507	\$629,219	.61
1876	516,269	598,776	1,115,045	691,327	.62
1877	896,346	566,446	1,462,792	833,791	.57
1878	1,238,626	573,533	1,812,159	987,626	.542
1879	1,399,094	756,850	2,155,944	1,174,989	.542
1880	1,545,715	941,638	2,487,353	1,343,170	.54
1881	1,505,262	1,340,103	2,845,365	1,564,950	.55
1882	1,365,177	1,451,558	2,816,735	1,718,208	.61
1883	1,290,373	1,899,794	3,190,167	1,738,640	.542
1884	1,210,455	2,313,644	3,524,099	2,008,736	.57
1885	1,196,297	3,059,927	4,256,224	2,234,517	.522
1886	763,999	4,428,224	5,192,223	2,959,567	.57
1887	1,958,032	4,943,739	6,901,771	3,140,305	.452
Total	15,393,454	23,397,930	38,791,384	\$21,025,045	

I draw your attention to the fact that the *declared* value is not always the true value; had the time permitted, I should have preferred making out the values in accordance with the average ruling prices of the different years. It is fortunate, however, that the above estimates are not very much out of the way, considering that they cover a very large amount of sweet or fortified wines, such as port, sherry, angelica, etc., and besides that large quantities of old and costly wines. You will also note the steady unceasing gain of the rail transportation over that of the sea without a single interruption from 1875 to 1887. This is caused on the one hand by the increased consumption in the eastern inland centers, and on the other, by an active and beneficial competition in the rates of freight between rail, steamer, sailing vessel, and a consideration of the important factors, time, interest, and insurance. With quick and certain delivery, the eastern merchant can do the largest amount of business with the lesser amount of invested

capital. It is the consideration of this fact that has caused most of our larger city and country wine merchants to establish branch houses in the most important eastern centers of trade. They are thus enabled to make quick and satisfactory deliveries.

Total Brandy Exports out of the State, with Declared Values and Computed Average Value per Gallon.

YEARS.	By Sea, Gallons.	By Rail, Gallons.	Total Gallons.	Total Value.	Average Price.
1875 -----	39,924	2,394	42,318	\$89,714	\$2 12
1876 -----	36,901	23,692	59,993	120,585	2 01
1877 -----	64,940	74,952	139,892	259,915	1 87
1878 -----	91,324	37,875	129,199	248,062	1 92
1879 -----	95,504	68,388	163,892	319,627	1 96
1880 -----	97,533	91,565	189,098	378,196	2 00
1881 -----	60,093	149,584	209,677	461,289	2 20
1882 -----	44,752	169,410	214,162	473,298	2 21
1883 -----	35,194	196,109	231,303	501,927	2 17
1884 -----	18,969	202,934	221,903	501,500	2 26
1885 -----	13,712	250,128	263,840	554,064	2 10
1886 -----	22,430	238,335	260,765	518,922	1 99
1887 -----	60,572	412,180	472,752	774,313	1 64
Totals -----	681,848	1,916,946	2,598,794	\$5,201,412	

The above table includes all shipments to foreign countries, and were such amounts considerable the average quoted would be overestimates, for there is no brandy shipped to foreign ports that is not shipped in bond, and thus free of the internal revenue tax of 90 cents per proof gallon. The only exception to this rule is such brandy as is shipped in cases; these are not within the bonding privilege, and it is a very great drawback to the brandy trade of our State that such privilege is not conceded by the Federal Government. Were we permitted to bottle our brandies in bond an enormous trade would spring up in foreign countries, especially those of Central and South America, Mexico, the Sandwich Islands, China, and Japan. These countries could thus also secure our brandies in their absolute purity, and would not be slow in their appreciation of that fact and make the most of it, both for ordinary as well as medicinal use. In the matter of transportation, the rail shows the most extraordinary increase over that of the sea; and if continued, as it must, it would take the entire brandy carrying away from the sea were it not for the slowly increasing trade of Mexico, the Islands, and Central America, as will be hereafter shown. It is by far more satisfactory, both to consignor as well as consignee, to have transportation of brandy made by rail rather than by sea, for reasons already mentioned for wine.

Sea Exports of California Wines, by Countries, to Foreign Ports, during 1875.

	Gallons.	Cases.	Value.
Central America	430	-----	\$279 00
British Columbia	405	118	719 00
Mexico	11,741	444	8,938 00
Honolulu	358	103	681 00
Europe	3,191	360	2,733 00
Panama and South America	363	84	520 00
Japan	70	168	672 00
China	48	37	178 00
Other countries	5,915	1,081	7,932 00
Totals	22,461	2,395	\$22,652 00

During 1876.

	Gallons.	Cases.	Value.
Central America	173	-----	\$102 00
British Columbia	986	184	1,347 00
Mexico	6,312	638	6,465 00
Honolulu	1,289	70	1,252 00
Europe	4,803	185	4,102 00
Panama and South America	-----	138	552 00
Japan	69	199	796 00
China	32	35	170 00
Other countries	6,894	776	7,078 00
Totals	20,558	2,225	\$21,864 00

During 1877.

	Gallons.	Cases.	Value.
Central America	12,250	1,449	\$11,105 00
British Columbia	306	23	423 00
Mexico	10,997	571	9,473 00
Honolulu	1,996	73	1,816 00
Europe	12,960	312	9,504 00
Japan	10	227	1,119 00
China	35	16	85 00
Panama and South America	328	107	577 00
Other countries	4,163	102	3,764 00
Totals	43,045	2,880	\$37,866 00

During 1878.

	Gallons.	Cases.	Value.
Central America	5,941	2,028	\$13,264 00
British Columbia	1,080	203	1,578 00
Mexico	8,825	422	6,989 00
Honolulu	439	73	737 00
Europe	2,990	73	2,985 00
Japan	202	186	937 00
China	80	51	447 00
Panama and South America	940	131	982 00
Other countries	7,812	246	5,898 00
Totals	28,309	3,413	\$33,817 00

During 1879.

	Gallons.	Cases.	Value.
Central America	5,740	2,297	\$8,991 00
British Columbia	111	30	322 00
Mexico	9,199	453	7,583 00
Honolulu	2,050	44	1,614 00
Europe	3,326	125	3,483 00
Japan	3,415	583	4,766 00
China	25	34	214 00
Panama and South America	138	142	655 00
Other countries	5,295	295	4,630 00
Totals	29,299	4,003	\$32,258 00

During 1880.

	Gallons.	Cases.	Value.
Central America	13,580	2,514	\$17,874 00
British Columbia	1,368	23	902 00
Mexico	18,219	834	14,292 00
Honolulu	1,431	306	1,915 00
Europe	96,681	174	66,916 00
Japan	207	75	489 00
China	61	61	452 00
Panama and South America	765	157	1,226 00
Other countries	10,133	271	11,565 00
Totals	142,445	4,415	\$115,631 00

During 1881.

	Gallons.	Cases.	Value.
Central America	14,165	2,829	\$23,704 00
British Columbia	1,530	40	1,352 00
Mexico	16,486	631	12,990 00
Honolulu	911	153	1,748 00
Europe	1,045	18	925 00
Japan	832	59	833 00
China	727	97	1,240 00
Panama and South America	3,984	171	2,582 00
Other countries	4,126	227	4,266 00
Totals	43,806	4,225	\$49,640 00

During 1882.

	Gallons.	Cases.	Value.
Central America	10,045	1,324	\$13,645 00
British Columbia	1,770	31	1,277 00
Mexico	18,107	1,134	18,004 00
Honolulu	695	287	2,165 00
Europe	2,018	73	2,280 00
Japan	624	91	834 00
China	497	107	1,318 00
Panama and South America	3,117	159	2,223 00
Other countries	9,318	451	9,999 00
Totals	46,191	3,657	\$51,745 00

During 1883.

	Gallons.	Cases.	Value.
Central America	9,683	1,629	\$18,081 00
British Columbia	3,620	67	3,238 00
Mexico	24,294	903	20,856 00
Honolulu	2,392	433	3,474 00
Europe	5,220	164	3,901 00
Japan	1,095	74	1,479 00
China	1,740	141	2,173 00
Panama and South America	5,474	191	2,615 00
Other countries	11,430	303	7,446 00
Totals	64,948	3,905	\$63,263 00

During 1884.

	Gallons.	Cases.	Value.
Central America	9,439	1,415	\$14,298 00
British Columbia	3,549	165	3,884 00
Mexico	14,467	761	15,929 00
Honolulu	2,762	1,567	8,510 00
Europe	5,969	209	6,009 00
Japan	1,940	192	2,359 00
China	1,244	62	1,080 00
Panama and South America	587	348	2,659 00
Other countries	8,053	155	6,916 00
Totals	48,010	4,874	\$61,644 00

During 1885.

	Gallons.	Cases.	Value.
Central America	16,404	2,194	\$24,700 00
British Columbia	5,975	179	6,472 00
Mexico	19,761	751	19,242 00
Honolulu	8,737	2,502	14,173 00
Europe	7,234	218	5,889 00
Japan	3,332	260	3,657 00
China	1,400	126	1,649 00
Panama and South America	2,768	130	2,057 00
Other countries	11,850	192	8,797 00
Totals	77,461	6,552	\$86,636 00

During 1886.

	Gallons.	Cases.	Value.
Central America	19,099	2,099	\$24,625 00
British Columbia	10,249	80	9,291 00
Mexico	24,330	401	16,965 00
Honolulu	41,096	1,520	44,565 00
Europe	3,768	314	3,192 00
Japan	10,124	204	4,570 00
China	668	673	2,242 00
Panama and South America	18,345	63	13,500 00
Other countries	11,397	289	6,459 00
Totals	139,076	5,643	\$125,409 00

During 1887.

	Gallons.	Cases.	Value.
Central America	31,260	2,534	\$34,654 00
British Columbia	13,313	215	9,717 00
Mexico	30,391	290	20,023 00
Honolulu	71,150	612	62,877 00
Europe	26,355	1,642	20,562 00
Japan	28,375	526	16,401 00
China	2,151	302	2,442 00
Panama and South America	26,449	67	11,151 00
Other countries	28,804	300	15,545 00
Totals	258,248	6,488	\$193,372 00

Resume of Sea Exports of California Wine by Countries to all Foreign Parts, from San Francisco, from 1875 to 1887, inclusive.

	Gallons.	Cases.	Value.
To Central America	148,209	22,312	\$205,322 00
To British Columbia	44,262	1,358	40,522 00
To Mexico	213,129	8,233	177,749 00
To Honolulu	135,306	7,743	145,527 00
To Europe	175,560	3,867	132,481 00
To Panama and South America	63,198	1,888	41,299 00
To Japan	50,295	2,844	38,912 00
To China	8,708	1,742	13,690 00
To other countries	125,190	4,688	100,295 00
Total foreign export	963,857	54,675	\$895,797 00

Total Yearly Sea Exports of California Wine to Foreign Countries, from San Francisco, from 1875 to 1887, inclusive.

YEARS.	Gallons.	Cases.	Value.
1875	22,461	2,395	\$22,652 00
1876	20,558	2,225	21,864 00
1877	43,045	2,880	37,866 00
1878	28,309	3,413	33,817 00
1879	29,299	4,003	32,258 00
1880	142,445	4,415	115,631 00
1881	43,806	4,225	49,640 00
1882	46,191	3,657	51,745 00
1883	64,948	3,905	63,263 00
1884	48,010	4,874	61,644 00
1885	77,461	6,552	86,636 00
1886	139,076	5,643	125,409 00
1887	258,248	6,488	193,372 00
Totals	963,857	54,675	\$895,797 00

The above tables show Mexico to have awakened to an appreciation of our wines earlier than any other foreign country, and to have continued that appreciation in a growing manner from year to year with but slight interruptions up to date. In 1886, however, she was outstripped by the Sandwich Islands by almost double, and in 1887 by more than double. Here we allude to wine in bulk only and not in cases or glass. Central America began recognizing the value of our wines in 1877, and, for local reasons, entered orders for notable quantities of cased wines, and continued

such orders up to date, in a uniformly satisfactory manner; at the same time running the demands for bulk wine close on to those of Mexico, and finally in the last year outstripping her neighbor by one thousand gallons. Japan, beginning with seventy-four cases and a modest one thousand gallons in 1883, has increased each year till in the last year twenty-eight thousand gallons and five hundred and twenty-six cases.

The Japanese must be acknowledged as decidedly a progressive people.

China, of all the countries, makes the poorest showing, though even that Celestial Empire has shown a slow-going increase.

British Columbia began awakening in this respect in 1880, and gradually increased her imports of our wines, until, in 1886, her demands reached ten thousand gallons, and in 1887 reached thirteen thousand.

The European countries have done very poorly with us, but that market recalls the carrying of coal to Newcastle. Spasmodic efforts have been made from time to time to place our wines in Europe, but up to this day with indifferent success, and yet her last year's taking, without forcing, of twenty-six thousand gallons and sixteen hundred cases of our wine, is somewhat encouraging, and it is my belief that if our wines go on increasing in quality, without too great an increase in price, that we will have an excellent market in certain European countries within a very few years. I allude to England, Scotland, Ireland, Belgium, Holland, and the north of Germany. In 1880, the bark *Stella* was laden with about ninety-five thousand gallons of our wine, and consigned on a venture to Germany. The venture brought our merchants a great deal, but was very disastrous in a financial point. The red wines she took were pronounced of the poorest quality (they were almost exclusively made from the Mission grape), but some of the white wines found some favor, as did the sweet white wines and the brandy, but all were pronounced entirely too high in price for the comparatively quality. In the following year, 1881, only one thousand gallons were shipped to Europe, and eighteen cases. However, the *Stella* venture created quite a commotion, and has since kept up a lively European interest in the progress of Californian viticulture, as shown by the gradually increasing figures.

Panama and South America, which showed an unreasonable advance and decline from 1875 to 1885, when they took about three thousand gallons, suddenly took eighteen thousand in 1886, and further increased their demand to twenty-six thousand cases in 1887. This must be attributed entirely to the building of the Panama Canal, and it should be exceedingly gratifying to us to see our wines meet those of France on neutral ground, and hold their own in quality as well as in price.

In the matter of totals from 1875 to 1887, inclusive, Central America bears the palm, and gives us the most satisfactory results, both in gallons of wine, numbers of cased wines, and in dollars and cents. Mexico follows next; Europe follows in gallons of wine, but falls considerably behind the Sandwich Islands in monetary value. In fact, the rank belongs to the Sandwich Islands, for the excess in gallons in favor of Europe was a chance won through the *Stella* episode, while the demand for Hawaii was a constant and legitimate demand. Then in rank follow Panama and South America. British Columbia ranks Japan slightly in value, but exceeds in gallons and numbers of cased wines. Thus showing a better quality of wine shipped to our English colonial neighbor.

Glancing at the table showing the yearly total exports to foreign countries, we must confess a gradual favorable increase, with three exceptions, from 1875 down to present date, in gallons, as well as in dollars and cents, and numbers of cases. If we consider all the efforts made, the result

might be considered trifling, but we must not lose sight of the fact that our greatest exports were made within the last two years, the latter one notably greater than its predecessor, thus showing a foothold gained, an advance made. In looking over the above tables, I look with the greatest interest upon the number of cases of wine exported to the various countries, and deem that country the most valuable to us that requires the greatest amount of cased wine. In the trade cased wines are always considered of better quality, more mature, and consequently commanding a better price than wines shipped in bulk. Besides that, being labeled and packed by local firms with their own labels and brands, they carry with them the reputation of our State, and herald whatever quality they may possess to any country and every clime which they may reach. Thus our good wines can proclaim themselves throughout the world, and increase both good name and trade. More than this, the handling and bottling of our wines is not always successful with those unaccustomed to their peculiarities, and thus our wines are often spoiled through ignorant management, and our representation thereby made to suffer. Furthermore, by casing and labeling our wines with our own labels, they can not be conveniently palmed off as foreign wines upon the confiding consumer. And lastly, the bottling, casing, and handling, gives work to so many more of our working men in wineries, box manufactories, nail factories, paper mills, glass works, printing, and numerous other local industries, all of which develop the resources of our State, and increase its prosperity.

While the above tables show the comparative sea exports of our wines to each country, for each year, the tables here following will show the drift, and such fluctuations as have occurred from year to year in our sea exports to each country in the past thirteen years. This arrangement shows at a glance the yearly progress of the trade with the different countries, and must prove of some interest to the vine grower, as well as to the merchants and transportation companies, and it is for that reason I have compiled them, and endeavored to rescue them from total oblivion.

CALIFORNIA WINE EXPORTS BY SEA TO NEW YORK AND FOREIGN COUNTRIES FROM SAN FRANCISCO, FROM 1875 TO 1887, INCLUSIVE.

To New York.

YEARS.	Gallons.	Cases.	Value.
1875	464,706	74	\$283,766 00
1876	493,459	841	299,318 00
1877	844,301	729	480,141 00
1878	1,200,471	864	642,301 00
1879	1,359,470	220	723,186 00
1880	1,373,730	318	725,373 00
1881	1,450,514	172	777,946 00
1882	1,408,316	571	780,394 00
1883	1,214,755	363	638,571 00
1884	1,149,579	269	626,132 00
1885	1,102,081	150	542,643 00
1886	610,366	180	289,792 00
1887	1,680,227	1,335	696,412 00
Totals	14,351,975	6,086	\$7,505,975 00

To Central America.

YEARS.	Gallons.	Cases.	Value.
1875	430	-----	\$279 00
1876	173	-----	102 00
1877	12,250	1,449	11,105 00
1878	5,941	2,028	13,264 00
1879	5,740	2,297	8,991 00
1880	13,580	2,514	17,874 00
1881	14,165	2,829	23,704 00
1882	10,045	1,324	13,645 00
1883	9,683	1,629	18,081 00
1884	9,439	1,415	14,298 00
1885	16,404	2,194	24,700 00
1886	19,099	2,099	24,625 00
1887	31,260	2,534	34,654 00
Totals	148,209	22,312	\$205,322 00

To British Columbia.

YEARS.	Gallons.	Cases.	Value.
1875	405	118	\$719 00
1876	986	184	1,347 00
1877	306	23	423 00
1878	1,080	203	1,578 00
1879	111	30	322 00
1880	1,368	23	902 00
1881	1,530	40	1,352 00
1882	1,770	31	1,277 00
1883	3,620	67	3,238 00
1884	3,549	165	3,884 00
1885	5,975	179	6,472 00
1886	10,249	80	9,291 00
1887	13,313	215	9,717 00
Totals	44,262	1,358	\$40,522 00

To Mexico.

YEARS.	Gallons.	Cases.	Value.
1875	11,741	444	\$8,938 00
1876	6,312	638	6,465 00
1877	10,997	571	9,473 00
1878	8,825	422	6,989 00
1879	9,199	453	7,583 00
1880	18,219	834	14,292 00
1881	16,486	631	12,990 00
1882	18,107	1,134	18,004 00
1883	24,294	903	20,856 00
1884	14,467	761	15,929 00
1885	19,761	751	19,242 00
1886	24,330	401	16,965 00
1887	30,391	290	20,023 00
Totals	213,129	8,233	\$177,749 00

To Honolulu.

YEARS.	Gallons.	Cases.	Value.
1875.....	358	103	\$681 00
1876.....	1,289	70	1,252 00
1877.....	1,996	73	1,816 00
1878.....	439	73	737 00
1879.....	2,050	44	1,614 00
1880.....	1,431	306	1,915 00
1881.....	911	153	1,748 00
1882.....	695	287	2,165 00
1883.....	2,392	433	3,474 00
1884.....	2,762	1,567	8,510 00
1885.....	8,737	2,502	14,173 00
1886.....	41,096	1,520	44,565 00
1887.....	71,150	612	62,877 00
Totals.....	135,306	7,743	\$145,527 00

To Europe.

YEARS.	Gallons.	Cases.	Value.
1875.....	3,191	360	\$2,733 00
1876.....	4,803	185	4,102 00
1877.....	12,960	312	9,504 00
1878.....	2,990	73	2,985 00
1879.....	3,326	125	3,483 00
1880.....	96,681	174	66,916 00
1881.....	1,045	18	925 00
1882.....	2,018	73	2,280 00
1883.....	5,220	164	3,901 00
1884.....	5,969	209	6,009 00
1885.....	7,234	218	5,889 00
1886.....	3,768	314	3,192 00
1887.....	26,355	1,642	20,562 00
Totals.....	175,560	3,867	\$132,481 00

To Japan.

YEARS.	Gallons.	Cases.	Value.
1875.....	70	168	\$672 00
1876.....	69	199	796 00
1877.....	10	227	1,119 00
1878.....	202	186	937 00
1879.....	3,415	583	4,766 00
1880.....	207	75	489 00
1881.....	832	59	833 00
1882.....	624	91	834 00
1883.....	1,095	74	1,479 00
1884.....	1,940	192	2,359 00
1885.....	3,332	260	3,657 00
1886.....	10,124	204	4,570 00
1887.....	28,375	526	16,401 00
Totals.....	50,295	2,844	\$38,912 00

To China.

YEARS.	Gallons.	Cases.	Value.
1875	48	37	\$178 00
1876	32	35	170 00
1877	35	16	85 00
1878	80	51	447 00
1879	25	34	214 00
1880	61	61	452 00
1881	727	97	1,240 00
1882	497	107	1,318 00
1883	1,740	141	2,173 00
1884	1,244	62	1,080 00
1885	1,400	126	1,649 00
1886	668	673	2,242 00
1887	2,151	302	2,442 00
Totals	8,708	1,742	\$13,690 00

To Panama and South America.

YEARS.	Gallons.	Cases.	Value.
1875	303	84	\$520 00
1876	-----	138	552 00
1877	328	107	577 00
1878	940	131	982 00
1879	138	142	655 00
1880	765	157	1,226 00
1881	3,984	171	2,582 00
1882	3,117	159	2,223 00
1883	5,474	191	2,615 00
1884	587	348	2,659 00
1885	2,768	130	2,057 00
1886	18,345	63	13,500 00
1887	26,449	67	11,151 00
Totals	63,198	1,888	\$41,299 00

To Other Countries.

YEARS.	Gallons.	Cases.	Value.
1875	5,915	1,081	\$7,932 00
1876	6,894	776	7,078 00
1877	4,163	102	3,764 00
1878	7,812	246	5,898 00
1879	5,295	295	4,630 00
1880	10,133	271	11,565 00
1881	4,126	227	4,266 00
1882	9,318	451	9,999 00
1883	11,430	303	7,446 00
1884	8,053	155	6,916 00
1885	11,850	192	8,797 00
1886	11,397	289	6,459 00
1887	28,804	300	15,545 00
Totals	125,190	4,688	\$100,295 00

It will be well to state here that we have no easy means of ascertaining how much wine and brandy may have been shipped overland by rail, to be afterwards forwarded from some Atlantic city to some foreign country. It is known, however, in a general way, that notable quantities of wine and

brandy have thus been sent across the continent and reshipped to Europe. Neither have I ready at hand a means of ascertaining the amounts of these products sent by rail to our sister republic Mexico, and yet they must be considerable.

The tables of sea exports of brandies from our port to foreign countries naturally follow those of wine, and though for the present this branch of the wine trade does not figure up largely in amounts, it is, nevertheless, of considerable interest, and recently shows very decided and encouraging gains. As our wines become more plentiful, and when those halcyon days for viticulture will arrive, when all the poor wines will be distilled, and only the good ones be sold to the trade and the consumer, then our brandy production will increase, a surplus arise, and a large exporting trade be possible. These tables may then be of some interest and value as a matter of reference and comparison. For the present, not being of as much consequence as the wine tables, I have simplified and somewhat curtailed their compilation.

CALIFORNIA BRANDY EXPORTS BY SEA TO NEW YORK AND FOREIGN COUNTRIES, FROM SAN FRANCISCO, FROM 1875 TO 1887, INCLUSIVE.

To New York.

YEARS.	Gallons.	Cases.	Value.
1875	49,352	74	\$111,041 00
1876	37,365	-----	84,071 00
1877	64,378	6	144,850 00
1878	84,794	6	190,786 00
1879	95,608	-----	205,118 00
1880	95,911	7	215,799 00
1881	58,036	1	129,495 00
1882	43,368	7	96,379 00
1883	34,362	7	79,681 00
1884	18,328	7	41,878 00
1885	11,169	-----	25,027 00
1886	19,173	2	37,702 00
1887	34,710	-----	67,413 00
Totals	646,554	117	\$1,429,240 00

To Central America.

YEARS.	Gallons.	Cases.	Value.
1875	-----	-----	-----
1876	-----	-----	-----
1877	-----	-----	-----
1878	-----	-----	-----
1879	-----	-----	-----
1880	-----	-----	-----
1881	185	25	\$486 00
1882	176	13	394 00
1883	-----	103	539 00
1884	273	-----	370 00
1885	180	4	497 00
1886	518	14	1,319 00
1887	453	45	1,490 00
Totals	1,785	204	\$5,095 00

To British Columbia.

YEARS.	Gallons.	Cases.	Value.
1875			
1876			
1877			
1878	60	29	\$270 00
1879	24		36 00
1880			
1881			
1882		4	28 00
1883	25	415	2,842 00
1884	42	35	298 00
1885	137	10	251 00
1886	975	105	1,954 00
1887	87	86	711 00
Totals	1,350	684	\$6,390 00

To Mexico.

YEARS.	Gallons.	Cases.	Value.
1875		10	\$70 00
1876	121		272 00
1877			
1878	192	32	508 00
1879	106	13	250 00
1880	100	67	619 00
1881	184	2	410 00
1882	398	32	821 00
1883	600		900 00
1884	56	6	141 00
1885	117	17	390 00
1886	527	61	1,425 00
1887	345	11	996 00
Totals	2,746	251	\$6,802 00

To Honolulu.

YEARS.	Gallons.	Cases.	Value.
1875			
1876			
1877			
1878			
1879	129	60	\$614 00
1880		297	1,589 00
1881	6	167	1,118 00
1882	286		429 00
1883		70	490 00
1884		674	4,718 00
1885	331	40	784 00
1886	239	15	464 00
1887	987	154	2,397 00
Totals	1,981	1,477	\$12,603 00

To Europe.

YEARS.	Gallons.	Cases.	Value.
1875			
1876			
1877	25		\$75 00
1878			
1879			
1880	477	1	1,203 00
1881	980		1,470 00
1882	284	2	401 00
1883	59		118 00
1884	25		50 00
1885	534		740 00
1886			
1887	23,871	145	27,273 00
Totals	26,255	148	\$31,330 00

To Japan.

YEARS.	Gallons.	Cases.	Value.
1875		1	\$10 00
1876		12	120 00
1877			
1878			
1879	704	3	1,125 00
1880	30	7	160 00
1881	15	10	130 00
1882			
1883		2	20 00
1884			
1885		7	10 00
1886	18	1	55 00
1887		2	20 00
Totals	767	45	\$1,650 00

To China.

YEARS.	Gallons.	Cases.	Value.
1875			
1876			
1877			
1878			
1879			
1880			
1881	10	1	\$40 00
1882		11	110 00
1883		4	40 00
1884		1	10 00
1885	3	2	29 00
1886			
1887		25	200 00
Totals	13	44	\$429 00

To Panama and South America.

YEARS.	Gallons.	Cases.	Value.
1875			
1876			
1877			
1878			
1879	53		\$106 00
1880	138	10	278 00
1881			
1882			
1883			
1884	46	30	392 00
1885			
1886		50	350 00
1887			
Totals	237	90	\$1,126 00

To Other Countries.

YEARS.	Gallons.	Cases.	Value.
1875	165		\$412 00
1876			
1877			
1878	644	10	1,549 00
1879	1,888		4,244 00
1880	22	17	225 00
1881	197	213	1,262 00
1882	336	19	906 00
1883	25	15	215 00
1884	137	47	481 00
1885	1,342	136	2,164 00
1886	1,650	148	4,219 00
1887	1,156	171	3,067 00
Totals	7,562	776	\$18,744 00

Total Sea Exports of Brandy from San Francisco to Foreign Ports, by Countries, from 1875 to 1877, inclusive.

	Gallons.	Cases.	Value.
Central America	1,785	204	\$5,095 00
British Columbia	1,350	684	6,390 00
Mexico	2,746	251	6,802 00
Honolulu	1,981	1,477	12,603 00
Europe	26,255	148	31,330 00
Japan	767	45	1,650 00
China	13	44	429 00
Panama and South America	237	90	1,126 00
Other countries	7,562	776	18,744 00
Totals	42,696	3,719	\$84,169 00

Total Sea Exports of Brandy from San Francisco to Foreign Ports, by years, from 1875 to 1887, inclusive.

YEARS.	Gallons.	Cases.	Value.
1875 -----	165	11	\$492 00
1876 -----	121	12	392 00
1877 -----	25		75 00
1878 -----	896	71	2,327 00
1879 -----	2,904	76	6,375 00
1880 -----	767	399	4,074 00
1881 -----	1,577	418	4,916 00
1882 -----	1,480	81	3,089 00
1883 -----	709	609	5,164 00
1884 -----	579	793	6,460 00
1885 -----	2,647	216	4,865 00
1886 -----	3,927	394	9,786 00
1887 -----	26,899	639	36,154 00
Totals -----	42,696	3,719	\$84,169 00

In glancing over the above tables of brandy sea exports to foreign ports, we cannot but note the small amount that has been taken by foreign countries, a little over forty-two thousand gallons, valued at \$84,000, in thirteen years' time. The reason for this is well known to the trade; outside of the relative high price of our brandy even when shipped in bond, that is, by non-payment of the internal revenue tax of 90 cents per proof gallon, the brandy is still too dear to well compete with the cheap imitation brandies sent to all parts of the world in cases and in bulk by Germany, France, and England, and though made of grain or corn spirits, are sold in those markets as genuine Cognac. This statement is fully corroborated by the reports made by our United States Consuls in France and Germany. Besides these fictitious brandies, which are so extensively used in Mexico, China, Japan, the Central and South American States, and the Sandwich Islands, we have likewise to compete in these markets with the still cheaper domestic spirits of those countries, such as rum in Central America, mescal in Mexico, and the distillations from rice in China and Japan, etc.

Furthermore, all these countries demand greater or less customs duties on entries of our brandies, which materially increases their cost, and prevents their greater consumption. In British Columbia, outside of the customs duties, we have to contend against the English, Scotch, and Irish whiskies and gins, and to which the English are already accustomed.

The valuation of the brandy shipped to British Columbia in 1883 seems to be excessive, but the bulk of it may have been some very old brandy distilled in San José, and held at from \$6 to \$8 per gallon, and \$20 to \$22 per case. This brandy is usually sold to clubs.

In the matter of the brandies exported, those shipped to Central America, British Columbia, Mexico, Honolulu, Japan, Panama, and South America, can be reckoned as generally going to the trade. Those to unmentioned countries can be considered as sample lots going partly to the trade and partly to the consumer. That quoted as going to Europe must be taken as merely small sample or trial lots up to 1887, when one trade lot of about twenty-two thousand two hundred and forty-six gallons were shipped direct to Germany as a venture. I surmise this lot will, when properly aged in the German warehouses, and *deftly fixed* and put into the French octave barrels, be returned to our country as a *ne plus ultra* genuine old Cognac brandy, and realize fabulous prices from our ever credulous American dudes.

And it is possible to do this with certain flavorings, as practiced in Europe, and *cutting* down the natural grape flavor with potato or grain spirit, and return the brandy thus disfranchised to the United States, with duties paid at less than \$3 25 per gallon. If cleverly done and sold through some well known importer, this brandy could easily be disposed of in the large eastern markets at from \$8 to \$10 per gallon, if jobbed out in the ordinary course to the trade. The consumer would afterwards most likely pay from \$12 to \$14 for it. That this can be done now, with the proper commercial connections abroad and in our country, and that it will be done in the near future, is my sincere belief. It is rather sad, however, to think that such methods have to be resorted to to induce the free born American patriot to appreciate the once undefiled production of his own country.

And right here, while speaking of the lack of general appreciation of our products among our American citizens, I desire to draw attention to the great injustice done our viticultural industry by the use of the foreign white wines, clarets, and champagnes, at public banquets given by public institutions.

While the figures given in this report very clearly show the growing appreciative acknowledgment of the good qualities of our wines, both in the Atlantic States and foreign countries, I confess with reluctance and some shame, that the average Californian citizen has the weakness and bad taste to allow his ignorance in wine matters to be swayed by his prejudice, and instead of purchasing wine for the sake of wine, purchases and sets on his table and before his guests, wine chosen on account of its high price, and peculiarly fashionable foreign name. Such questionable taste in display may be excusable in private life, but when extended to public banquets, on public occasions, by assemblages of men *supposed* to represent the interests of the State, such as the Chambers of Commerce, the Boards of Trade, the Fourth of July and National Political Committees, it then becomes a comical paradox, a farce beyond consistency, vulgar even to shoddyism, and I am sorry to acknowledge that such occurrences take place almost every day in this community.

In this free country any man has a right to use, eat, and drink what he pleases in private, but when representing a public interest in a public place, with the public money, or money subscribed or called from the community or the public, then he has no right to patronize, or show a partiality, or countenance, a competing foreign product. And I may add that if a consistent public spirit ruled the supposed representative men, political and commercial, of this community, as it does those of other communities, California wines would have the undisputed post of honor at every public banquet, whether it be that of the Chamber of Commerce, or that of the reception of a body of honorable Veteran Firemen, without murmur and without cavil. Fortunately, the present generation is but of a day, and it is to be hoped that their successors will have *some* public spirit, *some* local pride.

Among the most important work that should fall within the scope of this Commission is the endeavor to frame some national law for the protection of pure wine and the detection and prevention of those that are spurious. While the producers are entitled to this encouragement, the consumers, who are much greater in numbers, have a right to demand such protection to their purses as well as to their health. All spurious wines, if they are innocent in their action, should be plainly labeled to indicate their nature, and should be taxed. If not harmless, their manufacture and sale should be prohibited. No matter how cheaply we can produce and sell our wines

on this coast, the additional transportation cost to the Atlantic seaboard will always be great enough to permit a profit to the eastern compounder. Regarding immediate national legislation for the protection of the purity of our wines, and regulations for their sale, there is much to be said, but I will briefly state that the Commissioners of this Board have long ago carefully considered these points, and communicated the results of their deliberations to our Congressmen and Senators, urging them to use all means in their power to secure some effective law for the protection of pure wines. In response to the urgent and continued appeals of the Commissioners, several bills have been submitted on our behalf by Congressmen McKenna, Morrow, Felton, and Thompson, which, if passed, will give our industry great immediate relief. In this matter I may add that the several resolutions passed in our Board and forwarded to our Representatives at Washington, were adopted some two months afterward by the Vine Growers and Wine Makers' Association. As this required legislation will be discussed in the halls of Congress, I will not dwell further upon it; but before dismissing it I would give a timely word of caution to those who ask any reduction either on the tax on distilled spirits or on fruit brandies. I can foresee no greater peril to the advance of wine making in this State than such reductions. The Commissioners, after mature consideration, bringing their practical knowledge to weigh upon the matter in most of its bearings, have wisely concluded that it would be dangerous to our best interests to have the tax on fruit brandy either lessened or removed, except such as may be necessary for the production and preservation of sweet wines or for wines destined for export to foreign countries only. And it is to be hoped this judgment will prevail. In the meantime, the Commission should continue their endeavors to maintain a high internal revenue tax on distilled spirits of all kinds, whether they be grain or corn spirit, rum, alcohol, whisky, fruit or grape brandy. It should vigorously oppose any proposed reduction, for in such reduction lies the easier and most effective as well as the cheapest means of concocting spurious wines and adulterating those that are pure. With cheap distilled spirits all such imitations and falsifications are not only possible, but likewise profitable. The most effective of all ways to prevent and put a stop to this nefarious business of adulteration is to make it unprofitable. We should have pure wines for our whole country, cost what it may.

Next in importance in the work of the Commission should be the gathering of reliable facts in detail concerning the requirements and demands of the wine markets of the world—their requirements in regard to quality as well as quantity; the prices obtained in each great market; the cost and mode of transportation; the terms and methods of payment.

These facts once obtained should be constantly followed up from season to season, showing any changes taking place; should be kept for reference in the rooms of the Commission, free to the inspection of all interested, and should otherwise be published and made known throughout the State for the benefit of the whole viticultural industry whether individual or collective. Changes often take place in the larger wine markets, which, if known and made use of in time, would prove of the greatest assistance in placing considerable amounts of our wines in a profitable manner, and possibly secure us new and continuous markets.

Following these important future labors comes the necessity of establishing experimental vineyards, properly equipped and maintained in every prominent viticultural center of the State, for the sole purpose of ascertaining the adaptability of different vines to raise the best grapes, in the greatest abundance, with the least accidents or disease in the different

localities. Fresno County should have one, Santa Clara County another, Santa Cruz, Los Angeles, El Dorado, Alameda, Napa, Sonoma, and other great wine centers should each have their own experimental vineyards. All these should be modeled after one pattern, and planted in that kind of soil that is the most extensive in each individual district. Vines should be planted in these vineyards that previous preliminary local experimentation had indicated as the more valuable in point of quality, avoidance of danger, accidents, or disease, and giving the best monetary returns, yielding a just medium between the high grade and good ordinary wines which have proven the most remunerative in Europe as they will also do here. I look with the greatest solicitude at the efforts made by some of our vine growers who seek only for the highest known quality, regardless of the well known poor yielding qualities of the vines they plant. It is well enough to experiment in a small way, but to pursue such a course on an extensive scale is fraught with the greatest danger of failure and possibly ultimate financial ruin. What is needed above all considerations with us is good bearers with good quality, for, after all, the only means of proving a vineyard successful is its satisfactory financial returns. We had better leave the discoveries of the California Laffitte, the Chambertins, the Johannisbergers, and Tokays to chance or future generations, and for the present content ourselves in securing abundant yields of real good table wines with satisfactory moneyed returns.

These experimental vineyards should consist of not less than five hundred vines, of each of such varieties as might be considered the most desirable in each district; and these should be pruned and cultivated according to the different and most approved methods. Correct records should be kept for each variety; its general behavior under drought or superabundant moisture, great heat or excessive cold, liability to or freedom from disease of whatever nature it may be.

Observations should be made of that most important of all periods, the flowering of the vine, whether occurring at the season the strong spring and summer winds blow, or at a time when winds are unknown, and all is favorable to nature's effort; the watching for periods when the frost is most likely to occur, and numerous other similar contingencies. Then should follow close observations of the behavior of the vine during the periods of ripening, the first growth of the bunch, the formation of the seed, the swelling of the berry, the coloration of the grape, and the final ripening of the whole bunch. Then should come the testing of the saccharine and the comparison of the ripening periods in the different varieties. Following this would come the relative yield of the different varieties, and last, and most important of all, the market value of each different kind of grape. I would suggest that all the grapes grown on these different experimental vineyards should be sold in the general market, and thus test their relative monetary value practically for a number of years. The income so derived would most likely come near paying the current expenses of each station when the vines came into bearing. Owing to possible complications, it would be better to dispose of the grapes to the wine makers offering the highest price than to incumber the station with wine making, or entering into laboratory work; rather let the market determine the relative values. These experimental vineyards should be under the immediate supervision of the respective Viticultural Commissioners of each district. Of course it is to be supposed that the Governor would appoint practical viticulturists only, and such as are recognized capable of filling so important a position. Such a plan, if carried out, would cause giant strides to be made in every

part of our State towards the discovery of the most valuable grape or grapes for each locality.

Valuable determinations might so be made in less than ten years, while if left to the present limited resources of this Commission, or private experimentation, done in an unsystematic way, it might take fifty years to attain results that at best could not be complete or authoritative.

In continuation of the work of the Commission, the further introduction and popularizing of our wines among our own people in our own country should be immediately entered upon.

Now that we have accomplished the planting of numerous and extensive vineyards, are making some progress towards determining the greater value of a few varieties of grapes over others, and have succeeded in making fairly good average wines, we have the next most important task before us—that of finding consumers for all we will shortly be producing. The best market must be considered the home market. That market is proven the best in every prominent wine-making county of the world, and I can not see why it should not be so with us. The greatest obstacle to our success in this direction is, that the average American is a whisky drinking, water drinking, coffee drinking, tea drinking, and consequently a dyspepsia inviting subject, who does not know the use or value of pure light wine taken at the proper time and in moderate quantities. The task before us, therefore, lies in teaching our people how to drink wine, when to drink it, and how much of it to drink. This serious and most important task should be undertaken at once for the benefit of health and the promotion of temperance. The knowledge of the benefits of proper wine drinking should be heralded by the newspapers, sown broadcast through books, pamphlets, and circulars, proclaimed by lecturers from the rostrum, and championed from the pulpit. The knowledge of how to properly make use of this valuable product to man should be made universal, and handed down from father to son in the same manner as family legends are handed down for generations. The people should be taught in the selection of wines for their daily meal, as are best suited to the maintenance of health and bodily vigor, as well as for agreeableness of taste. They should be taught the value of the different kinds of wine as food adjuncts; they should be taught in detail the simple but very necessary cares needed for the preservation of their household wines, and their presentation on their tables in a proper condition and attractive manner. Extracts from such books as that written by Dr. Druitt, the eminent physician and viticultural writer, should be freely circulated throughout the land, and placed within the reach of the masses to learn the use of wine, to beware of its abuse, and become the exponents of true temperance. At this stage of our viticultural progress, I consider it more important to teach the people the proper use of wine as a daily beverage, than the extension of our vineyards, or any other viticultural work that the Commission can enter upon. At this critical moment our future success depends upon the immediate popular increased consumption of our wines, more than greater production, increased quality, or any other thing that I can think of.

And while we are considering the matter of greater consumption and larger markets for our wines in our own country, it may be well to draw attention to the fact that freight rates very greatly influence the possible increase or decrease of our eastern and interior shipments. Thus, under former stiff rates, our shipments eastward shows a pretty constant annual increase of three hundred thousand gallons, from year to year, for nearly ten years. Under the lower rates of 1885 the increase suddenly went up to seven hundred thousand three hundred and fifty gallons over the pre-

vious year. And in 1886, when *cut rates* were ruling, there was a further increase over that of the year 1885 of nine hundred and thirty-six thousand gallons. It would be well for the transportation companies to consider this fact, and devise some means for the transportation at such rates as will permit this industry to develop its magnitude, and increase their own carrying trade. Owing to the distance separating us from our natural markets, we, in California, have much to contend against. The wood from which our shipping casks are made is brought from the east by rail, and is charged for at so much a pound, coming to us empty, and so much a pound going away from us filled with wine. These additional costs, and they are not moderate, increase the price of wine to the consumer, and tends to prevent its more general use in the Atlantic and Western States. When our wines, in all their unrivaled purity, can be laid down at the door of the eastern laborer at the same price to him as beer, this industry will develop beyond our most sanguine expectations.

Shortly after the organization of the Commission the need of a viticultural library was keenly felt, and as soon as our funds permitted the outlay, the proper committee set about collecting all the works obtainable, printed in the English language, on vine growing, diseases of the vine, wine making, and fermentation. Then all procurable French works relating to these were added through much labor and some considerable delay. At the present time a collection is under way in the procuring of German, Italian, and Spanish works covering the same subjects.

At this date our library consists of four hundred and twenty-one volumes, and is without doubt the most complete viticultural library in America, and one that our State may well be proud of. The detailed catalogue of these books you will find in the report of the Secretary herewith transmitted.

As a matter of future reference, I herewith transmit the following volumes and pamphlets printed under the auspices of the Commission, a number of which being out of print are not easily duplicated and hence the more sought after:

- Annual Report of the State Viticultural Board of Commissioners, 1881.
- First Annual Report of the Chief Executive Viticultural Officer, 1881.
- Insects Injurious to Fruit and Fruit Trees of California.
- Annual Report of the Board of State Viticultural Commissioners, 1882.
- First Report of the State Horticultural Commissioners of California, 1882.
- Second Annual Report of the Chief Executive Viticultural Officer—Appendix I—1882, 1883.
- Second Annual Report of the Chief Executive Viticultural Officer—Appendix II—1882, 1883.
- Second Annual Report of the Chief Executive Viticultural Officer—Appendix III—1882, 1883.
- Annual Report of the State Board of Horticulture, 1883.
- Report of the Third Annual State Viticultural Convention, 1884.
- Ampelography of California, by Charles A. Wetmore, Chief Executive Viticultural Officer, 1884.
- Viticulture and Viniculture in California, from Reports of the Board of State Viticultural Commissioners, 1885.
- Report of the Fourth Annual State Viticultural Convention, 1886.
- Report of the Fifth Annual State Viticultural Convention, 1887.
- Annual Report of L. J. Rose, Commissioner for the Los Angeles Viticultural District, 1887.
- Annual Report of I. DeTurk, Commissioner for the Sonoma Viticultural District, 1887.
- Annual Report of George West, Commissioner for the San Joaquin Viticultural District, 1887.
- Annual Report of the Chief Executive Viticultural Officer—Oidium (Tuckeri) and the Use of Sulphur, Appendix I—1887.
- Annual Report of the Chief Executive Viticultural Officer—"The Pure Wine Bill," Appendix II—1887.
- Annual Report of the Chief Executive Viticultural Officer—"Bleaching Seedless Sultana Raisins," Appendix III—1887.

Annual Report of the Chief Executive Viticultural Officer—"How to Avoid and Correct Imperfect Fermentation," Appendix IV—1887.

Directory of the Grape Growers and Wine Makers of California, containing the names and post office addresses of nearly six thousand California viticulturists.

Following these, as soon as the State Printer can get them printed, will come the Annual Report of the Commission for 1887, which will contain:

Report of the President, Arpad Haraszthy.

Report of Commissioner L. J. Rose, for the Los Angeles District.

Report of Commissioner I. DeTurk, for the Sonoma District.

Report of Commissioner George West, for the San Joaquin District.

Report of Commissioner Charles Krug, for the Napa District.

Report of Commissioner Charles A. Wetmore, for the San Francisco District.

Report of the Secretary of the Board of Viticultural Commissioners, which will include sessions of the Board, accounting of expenditures, property on hand, including the catalogue of the library, etc.

Report of the State Analyst on wines, finings, and other materials analyzed. Also the safety of using arsenic remedies against vineyard pests.

Report of the Chief Executive Viticultural Officer, including work of the year 1887.

Appendix I—Oidium and the Use of Sulphur.

Appendix II—The Pure Wine Bill Explained.

Appendix III—Bleaching of Sultana Raisins.

Appendix IV—How to Avoid and Correct Imperfect Fermentation.

Then in due course will follow the report of the Sixth Annual State Viticultural Convention, which will contain all the original papers read during the Convention; the most important discussions there entered into; a complete list of wines submitted for investigation, together with a list of those awarded the highest classification, and other matters of interest and value.

I regret to state that owing to the insufficient appropriation made the State Printing Office, much of the value of the work of the Commission is lost. It often happens that information comes to this office, which, if printed immediately, and sent at once to the vine growers of the State, would be of great value to them, and yet when such chances come about, it was found that the State Printer had other work ahead, or that the appropriation of his office was exhausted; the latter being most generally the case. We have thus been continually thrown upon the public spirit and generosity of the newspapers. These, though always willing to accord a certain amount of their valuable space, could not give all that we have often required. In the matter of engravings and illustrations, the Commission has been made to shift as best it could, for those very great essentials could not be supplied by the State Printer, and yet in viticulture cuts and illustrations are often quite as necessary and valuable as the letter press itself. Some remedy should be found to overcome these drawbacks, and the first that suggests itself is a very largely increased appropriation for the State Printer's office, as well as more discretionary latitude accorded to the State Printer himself, in the use of the funds of the appropriation.

The tariff question is another matter of very serious import to the wine and raisin producers of our State, and should demand our continual watchfulness. A high tariff on foreign wines has been the means of introducing our wines among our own citizens, extending the area of our vineyards, giving a living employment to more than thirty thousand souls of the population of California, increasing its wealth, and giving the whole of the United States wine cheaper than it could have ever been had from foreign countries without such protective tariff. It is internal competition, that strong regulator of labor, wages, and enterprise within a country, that has made wines so cheap with us that the poorest workman in the land no longer looks upon it as a luxury, and need not be without it. I doubt whether such results could ever have been brought about except by a protective tariff. In fact, our large plantings, and the largely increased con-

sumption of our wines, began only after the tariff was raised, and to-day the result shows that the consumer is the one that has profited most by the change. A reduction of tariff on any article competing with American industry, whether it be wine, raisins, wool, silk, or sugar, or anything else, and we should bear it well in mind, is a blow struck at us, at our industry, at our homes. If we want protection for ourselves, then we should uphold every branch of American industry that we can encourage with our voices and protect with our votes.

Respectfully,

ARPAD HARASZTHY,

President of California Board of State Viticultural Commissioners.

ANNUAL REPORT
OF
CHARLES KRUG,
Commissioner for the Napa District, 1887.

To the Board of State Viticultural Commissioners:

GENTLEMEN: I have obtained the following statistics for Napa County, having devoted myself most exclusively to this county, because it ranks first in importance in this district. I had hoped to gather important data respecting the other counties included in this district, but for want of time have found it impossible up to the date of this writing.

Yours respectfully,

CHARLES KRUG,
Commissioner for the Napa District.

VARIETIES OF GRAPES PLANTED.

Post Office.	ACREAGE.		All Riesling	Chasselas Font., Palomino, and Burger	Sauternes, incl. Sauv. Vert	Cab. Sauv., Fr. Merlot, Verdot, Malbec	All Reds, except Zin., Miss., and Malv.; all Pinots, Ch. Noir, Ali- cante, Petit, etc.	Zinfandel	Mostly Miss. and Malv.	Table and Raisin	Tons of Grapes— 1886	Gallons of Wine made—1886	Gallons of Brandy made—1886	Redstart Vines, Acres—1887
	1881.	1887.												
Conn Valley	223	637	32	112	3	5	60	390	53	1	1,390	150,000		
Spring Mountain	55	355	11	58	5	10	20	216	32	3	400	21,000		
Pope Valley	20	105	2	29		1	1	36	85	4	156	4,000		
Beryessa	18	33		5				12	16		150			
Childs Valley	13	129	15	16	8	5	10	55	20		196	6,000		10
Howell Mountain	100	690	85	110	20	65	150	215	45		390	40,000		20
Calistoga	250	1,710	254	243	25	119	160	522	275	12	2,000	646,000		72
St. Helena	1,611	5,246	963	797	83	255	551	1,831	694	17	14,387	1,777,000		49
Rutherford	721	1,527	260	213	55	45	191	452	94		4,611	464,000		20
Oakville	429	1,085	317	144	33	54	89	433	99	11	4,032	800,000		30
Yountville	585	1,474	264	339	43	28	117	582	195	12	3,960	212,000		25
Napa	1,260	3,340	433	551	137	192	259	1,000	423	50	7,303	348,000		425
	5,285	16,611	2,036	2,597	412	779	1,008	5,744	2,031	109	39,595	4,468,000	102,322	651

THE ADVANTAGES OF PLANTING VINES $3\frac{1}{2} \times 14$ FEET.

[A treatise prepared by CHARLES KRUG, Commissioner for the Napa District.]

The most common system of planting adopted in California is that of squares, with the vines placed at seven feet apart. Some sections adopt a greater distance, eight feet prevailing in many interior districts—some vineyards even exceeding this, running up to ten, or even twelve feet.

These greater distances have been chosen for several reasons. It greatly facilitates the plowing and working of the vines, gives a less number to plant, prune, and care for, and where raisin and table grapes are desired, the size and beauty of the berry is considerably improved.

European countries, devoted to wine making, crowd the vines close together, two and one half to three feet from each other in the rows, and the rows three or four feet apart. Close planting is particularly practiced in the renowned vineyards, where it is thought the small quantity of grapes thereby produced on each plant adds to the quality of the wine.

In the spring of 1881 I had sixteen acres of choice varieties of vines planted on Howell Mountain, and chose for distances three and one half feet in the rows, the latter being fourteen feet apart. I selected this method on account of the easier plowing secured thereby on the steep hillside which formed the locality chosen. Lately I have adopted this method for planting on valley land, convinced that it possesses many advantages over the "square" system heretofore employed. Some of these advantages may be enumerated, as follows:

1. Fifty per cent of the plowing now done with one horse will be performed with two animals and a large plow, thus securing deeper and more perfect tillage. The larger tools accomplish the work more rapidly, and three or four horse tools may be easily and safely worked in the rows—each one forming a complete avenue.

2. The gathering of the brush will consume only one third of the time and labor that is commonly employed in carrying it to avenues some distance apart. Here the prunings may be thrown into piles at convenient distances along the fourteen feet rows and burned, without danger to the vines, and each pile will thus return to its respective vines a fair portion of the fertilizers produced in its ashes.

3. Sulphuring may be done more quickly and economically in the fourteen feet rows, as a cart or wagon may be used to haul the barrel of sulphur to the laborers—this throughout the whole vineyard, and the driver may even assist in the work without leaving his vehicle.

4. Spraying the vines—a practice which is likely to come into vogue in our vineyards some day, as it has in European vineyards—would be greatly facilitated, in that the whole appliance may be hauled and worked by horse power. At present the prevailing custom is for each operator to carry the solution in a reservoir strapped on to his back.

5. The empty grape boxes can be easily and directly distributed to the pickers, and the boxes, when full, may be placed directly upon the wagon to be hauled to the cellar. Much time and labor is at present wasted in forcing the pickers to carry the heavily loaded boxes some distance to the avenues, perhaps from the middle of the block.

6. When cultivating has ceased—usually in June—for two months, the teams, which are otherwise likely to be idle, may be profitably used to improve the land by hauling manure to the vines, filling up low places with dirt or sand, or carrying off roots, etc. Also, the work of preparing

drains and such, may be all easily and cheaply done without, in anywise, interfering with the growing vines.

But this method recommends itself not only for planting new vineyards, but also for changing old vineyards from seven by seven feet to three and a half by fourteen feet, or from eight by eight feet to four by sixteen feet, giving the proprietor a fine opportunity to transform his vineyard from a *vinifera* root vineyard to a resistant root vineyard. This can be accomplished by planting resistant roots in the alternate rows to be preserved, right between the two old vines. As soon as these resistant roots produce four feet long canes, the adjoining old *vinifera* vines, in the same rows, when attacked by phylloxera or otherwise, may be taken out and the canes from the resistant vines laid under ground to the place where the old *vinifera* vines stood; which layers, with the support of the nourishment from the mother roots, will make a rapid growth and be soon strong enough to be grafted. In the meantime the second rows should be taken out as soon as the grafted resistant vines and layers are producing a crop. They then continue to bear their usual amount of grapes, and the income from the vineyard is only slightly lessened during this transformation.

Our old vineyards planted to Mission and Malvasia will soon be matters of the past. Fine varieties are being grafted on their roots, or the old stumps are pulled out and resistant stock put in their place, when grafting to fine varieties follows in a year or two afterwards. Vineyards suffering from the ravages of the phylloxera are greatly favored by this process.

For varieties, grafts are taken mostly from *Cabernet Sauvignon*, *Cabernet Franc*, *Petite Sirrah*, *Mondeuse*, *Miller's Burgundy*, *St. McCaire*, *Beclan*, *Carignan*, *Mataro*, *Tannat*, etc. (red), or from *Riesling*, *Semillon*, *Sauvignon Blanc*, *Folle Blanche*, *Traminer Sylvaner*, *Sauvignon Vert*, etc. (white); and the quality of future vintages produced from these will soon surpass all previous ones.

The low price of grapes and vines which have ruled during the past two years have caused a perfect stagnation in vineyard planting in our district. Many parties before interested in viticulture are discouraged. I wish to assure them that their doubts in regard to success are without foundation. Inferior wines will soon disappear from our markets; only fine wines will be offered to consumers; the demand for our better goods will continue to steadily increase, and the common sense of the American people will not, as has been thought by some, be permanently misled by the prohibitionist. Wine and brandy warehouses will give the vintner a chance to refuse ruinous prices. In short, our industry will soon again see better days, and grape growing and wine making will yet again be the best paying industry in our glorious State. The counties raising the best dry wines will stand on the top of the ladder and command the markets of the country.

CHARLES KRUG,
Viticultural Commissioner for the Napa District.

REPORT OF THE COMMITTEE APPOINTED TO EXAMINE INTO
THE USES OF MERCURY FOR DESTROYING PHYLLOXERA.

[By CHARLES KRUG, Chairman of the Committee.]

ST. HELENA, June 27, 1887.

To the Board of State Viticultural Commissioners:

GENTLEMEN: At the regular meeting of the Board, held in the early part of the present month, you appointed a committee to examine the Hagen Vineyard, near Napa, in order to determine the effect of the mercurial remedy which had here been applied for the destruction of phylloxera some years previous. This committee consisted of Charles Krug, H. W. Crabb, and your Chief Executive Officer, J. H. Wheeler. It is now my duty to report to you thus promptly the result of our investigations.

First, let it be understood that the remedy had been applied under the personal direction of its inventor and exponent; it may therefore be presumed that the work was properly and thoroughly done. To prepare the mercury for this use, it is reduced by triturating with clay to a state of minute division. A small quantity of the mixture, sufficient to include one half ounce of quicksilver, is placed in the hole prepared for receiving the cutting or rooted vine. Its presence here, and spreading—a quality peculiarly possessed by this metal—is expected to destroy the phylloxera, and preserve the vines from further attacks.

Mr. Crabb was unable to accompany me, but Mr. Wheeler and myself, on the sixteenth instant, examined carefully the vines treated, together with those left untreated in Mr. Hagen's vineyard, and could observe no difference in favor of the remedy. The vines were young, of only a few years planting. The roots of many of those treated we dug up, and they revealed the presence of a multitude of insects actively engaged with their work of destruction, their damage plainly evidenced by the swollen roots, rotten fibers, and nodosities. All of the plants exhibited a languishing appearance in the foliage, and proved unsatisfactory in other respects.

It will be remembered that exhaustive experiments were conducted by this Board with the same remedy, in Sonoma and elsewhere in 1885 and later, with results identical with those here noted and reported; and although the Board was satisfied at that time as to the inefficiency of the remedy, this committee was appointed and attention was again called to the matter at the solicitation of the inventor of the remedy.

We are now able to confirm the results announced some years since as to the total inefficiency of the so called remedy.

OTHER OBSERVATIONS ON RESISTANT VINES.

A few Lenoir vines were found apart from the treated spot, but on similar soil and with other conditions equal. These, though not treated with any remedy, exhibited a vigorous growth, notwithstanding the presence of the few phylloxera which we found on their roots.

Riparias, also untreated, were found on the same ground; they showed a small growth, though the roots were free from phylloxera or nodosities. The *Californica* had been tried, too, but they did not appear healthy or vigorous, and the roots were found infested, very knotty, and bad.

While visiting Mr. Hagan's vineyard, we were led to examine an old wild vine—*V. californica*, which appeared like one infested with phylloxera.

This surmise proved correct, for the roots were found destitute of healthy fibers, and the old roots, where not already rotted, were actively crowded with the dreaded pests. This vine was large and old, growing in its native soil, and that the rich mould of a creek bottom. The cañon wherein it grew was some distance from the nearest growing infested *viniferas*, and it seemed that the disease must have come to the wild vine through the winged form.

The Commission has often sought for evidences of phylloxera on our wild vines in their native state, but up to this time none have been found, this being the first case of the kind discovered.

Yours very respectfully,

CHARLES KRUG,
Chairman Committee.

MEANS OF FORETELLING FROST.

[Correspondence of CHARLES KRUG.]

With a view to providing facilities for anticipating frost and averting the damage, as we may sometimes do, by means commonly known, I have thought it advisable to append the following, which has provided a grain of comfort to me and others who have suffered somewhat during the present season. The letter explains itself so lucidly as to call for no comment from me, and I desire to express to Mr. Maxfield particular obligation for his promptness and courtesy.

CHARLES KRUG.

SIGNAL OFFICE, WAR DEPARTMENT (BRANCH), }
SAN FRANCISCO, CAL., March 22, 1887. }

MR. KRUG, *Saint Helena, California* :

DEAR SIR: I am pleased to inclose herewith instructions for the use of the wet and dry bulb thermometers, and a dew-point table, which I hope will prove satisfactory to you in foretelling frost.

Very respectfully yours,

J. E. MAXFIELD.
Second Lieutenant, Signal Corps, U. S. A.

THE WET AND DRY-BULB HYGROMETER.

To keep this instrument in working order, one or two things require special attention. The thermometers must be alike, for if one is filled with mercury, and the other with spirits, or if they contain different quantities of the same fluid, the readings will be vitiated. All starch, or foreign matter, should be washed out of the thin muslin covering and cotton wicking. The water used should be pure, for if lime or other salts be dissolved in it, the muslin will soon be coated with a calcareous or other incrustation. Rain or distilled water should be used. The muslin ought to be changed when covered with dust or other impurities, and care should be taken not to touch the muslin with the fingers, otherwise it will get slightly greased, and capillary attraction will be thereby interfered with. The bulbs of the thermometers should be made one and one half or two inches below

the scale. The thermometers should also be a little apart from each other, and the vessel containing the water be as far removed as possible from the dry-bulb. The thermometer should be exposed to the air where the circulation is unobstructed. They should face the north, and should always be in the shade. They should be removed at least a foot from the wall of any building, and should be about ten feet from the ground. They should be protected against the heat reflected by neighboring objects, such as buildings or a sandy soil, and they should be sheltered from the rain. If the dry-bulb should become moistened by rain, the bulb should be carefully dried about five minutes before making the observation; since drops of water, by their evaporation, would lower the temperature of the mercury in the bulb.

The dew-point can readily be determined by the following rule and table:

Rule.—Subtract the readings of the wet-bulb from that of the dry-bulb; find the temperature of the dry-bulb in the left hand column of the table, opposite which, in the column that is marked at the top, with the difference between the wet and dry-bulb, is to be found the dew-point sought.

Example	{	Dry-bulb	47°
		Wet-bulb	40°
Difference of depression of wet-bulb			7°

Looking for the temperature of 47° on the left of the table we find in the column under the 7° the figure 28, which is the dew-point.

Whenever the dew-point in evening is below 32°, expect a frost before morning if sky is clear and there is not much wind.

DEW-POINT TABLES.

Air Temperature.	DIFFERENCE BETWEEN READING OF DRY AND WET-BULB.													Air Temperature.	
	0	1	2	3	4	5	6	7	8	9	10	11	12		13
*30	*30	*27	*24	*22	*17	*13	*7	†1	†11	†30	-----	-----	-----	-----	*30
31	31	28	25	22	18	14	9	*2	†7	†23	-----	-----	-----	-----	31
32	32	29	26	23	20	16	11	5	†3	†17	-----	-----	-----	-----	32
33	33	30	27	24	21	17	13	7	†1	†12	†32	-----	-----	-----	33
34	34	31	28	26	22	19	15	9	*2	†7	†23	-----	-----	-----	34
*35	*35	*32	*29	*26	*24	*20	*16	*11	*5	†3	†17	-----	-----	-----	*35
36	36	33	30	27	24	21	18	13	8	†1	†12	†32	-----	-----	36
37	37	34	32	29	25	21	19	15	9	*3	†7	†23	-----	-----	37
38	38	35	33	30	26	23	19	17	11	6	†3	†16	-----	-----	38
39	39	36	34	31	28	24	20	16	14	8	0	†11	†31	-----	39
*40	*40	*37	*35	*32	*29	*26	*22	*18	*12	*10	*3	†6	†22	-----	*40
41	41	39	36	33	30	27	23	19	14	8	6	†2	†15	-----	41
42	42	40	37	34	31	28	25	21	16	10	3	*2	†9	†29	42
43	43	41	38	35	33	30	26	22	18	13	6	†3	†5	†20	43
44	44	42	39	37	34	31	27	24	20	15	9	*1	†12	†13	44
*45	*45	*43	*40	*38	*35	*32	*29	*25	*21	*17	*11	*4	†7	†27	*45
46	46	44	41	39	36	33	30	27	23	19	14	7	†2	†18	46
47	47	45	43	40	37	35	32	28	25	21	16	10	*2	†11	47
48	48	46	44	41	39	36	33	30	26	22	18	12	5	†6	48
49	49	47	45	42	40	37	34	31	28	24	20	15	8	†1	49
*50	*50	*48	*46	*43	*41	*38	*36	*33	*29	*26	*22	*17	*11	*3	*50
51	51	49	47	45	42	40	37	34	31	27	23	19	13	6	51
52	52	50	48	46	43	41	38	35	32	29	25	21	16	9	52
53	53	51	49	47	44	42	40	37	34	30	27	23	18	12	53
54	54	52	50	48	46	43	41	38	35	32	28	24	20	15	54
*55	*55	*53	*51	*49	*47	*45	*42	*39	*36	*33	*30	*26	*22	*17	*55
56	56	54	52	50	48	46	43	41	38	35	32	28	24	19	56
57	57	55	53	51	49	47	45	42	39	36	33	30	26	22	57
58	58	56	54	52	50	48	46	43	40	38	35	31	28	24	58
59	59	57	55	53	51	49	47	45	42	39	36	33	29	26	59
*60	*60	*58	*56	*54	*52	*50	*48	*46	*43	*41	*38	*35	*31	*28	*60
61	61	59	57	56	54	52	49	47	45	42	39	36	33	29	61
62	62	60	58	57	55	53	51	48	46	43	41	38	35	31	62
63	63	61	60	58	56	54	52	50	47	45	42	39	36	33	63
64	64	62	61	59	57	55	53	51	49	46	44	41	38	35	64
*65	*65	*63	*62	*60	*58	*56	*54	*52	*50	*48	*45	*42	*39	*36	*65
66	66	64	63	61	59	57	55	53	51	49	46	44	41	38	66
67	67	65	64	62	60	58	56	54	52	50	48	45	43	40	67
68	68	66	65	63	61	59	58	56	54	51	49	47	44	41	68
69	69	67	66	64	62	61	59	57	55	53	50	48	45	43	69
*70	*70	*68	*67	*65	*63	*62	*60	*58	*56	*54	*52	*49	*47	*44	*70
71	71	69	68	66	65	63	61	59	57	55	53	51	48	46	71
72	72	71	69	67	66	64	62	60	58	56	54	52	50	47	72
73	73	72	70	68	67	65	63	61	60	58	56	53	51	49	73
74	74	73	71	69	68	66	64	63	61	59	57	55	52	50	74
*75	*75	*74	*72	*70	*69	*67	*65	*64	*62	*60	*58	*56	*54	*51	75
76	76	75	73	71	70	68	67	65	63	61	59	57	55	53	76
77	77	76	74	72	71	69	68	66	64	62	60	58	56	54	77
78	78	77	75	74	72	70	69	67	65	64	62	60	58	55	78
79	79	78	76	75	73	71	70	68	66	65	63	61	59	57	79
*80	*80	*79	*77	*76	*74	*73	*71	*69	*68	*66	*64	*62	*60	*58	*80

* Above zero. † Below zero.

ANNUAL REPORT
OF
I. DETURK,
Commissioner for the Sonoma District, 1887.

To the Board of State Viticultural Commissioners:

GENTLEMEN: The undersigned Viticultural Commissioner for Sonoma District, which includes the counties of Sonoma, Marin, Lake, Mendocino, Humboldt, Del Norte, Trinity, and Siskiyou, herewith submits a report of the grape-growing interest of said district.

Since making the last report, there has been a large increase in acreage, and a marked improvement in varieties of wine grapes.

QUALITY.

We find the quality of our wines very much improved as the vineyards age. The old Mission grape, that years ago made very harsh and rough wines, now produces from the same vineyard wines which would not be recognized as Mission; these wines are now mild, soft, and agreeable in taste. There is no doubt that as the vineyards age, we will be able to produce as good wines as those from European vineyards.

We must, however, look to the best European varieties of wine grapes for the future fine wines of California, it having been thoroughly proven by actual experience that the fine wine grapes of Europe preserve their best characteristics in California. I would recommend to all those who intend setting out new vineyards, that they plant only the choicest European varieties, as these varieties are now abundant enough to be obtained from almost any of the vineyards throughout this district.

SONOMA COUNTY.

According to the assessor's report of Sonoma County, there are twenty-five thousand acres planted in vineyard, aggregating twenty million vines. Sonoma Valley and adjacent hills have long since proven their superiority for fine wines, and the country lying between the Sonoma Valley, Santa Rosa, Healdsburg, and Cloverdale, has a well established reputation for fine quality in grapes and wine.

Experience has taught that the hilly lands of this district are specially adapted to the wine grape. In fact, the same rule applies in California as in Europe, viz.: the best wine grapes are produced on hilly land.

YIELD OF WINE.

It is well known that in the famous vineyards of Europe, the yield of wine is comparatively small. It is not claimed that the vineyards of Sonoma District yield so largely of grapes as other grape-growing sections, but we believe the future will prove our wines to be of superior quality.

AGING.

It has been claimed that California wine does not improve after two or three years, and that the wine should be drank by the time it is three years old. This advice is calculated to deter people from holding their wine to age. The fact is, that California wine improves by age as much as any other wine. However, the wine for aging must be sound and well fermented. My experience is that wine is not a good and wholesome drink until it is two years old and over.

VARIETIES FOR IMPROVEMENT.

As a greater portion of our vineyards are planted with Zinfandel for red wine, I would recommend for improvement in quality, grafting in say from five to ten per cent of Cabernet Sauvignon, Cabernet Franc, or Merlot; these varieties are shy bearers, but of high quality. For quantity and quality combined, I would recommend the Tannat and St. Macaire. By such grafting we will by degrees improve and change the quality of our wines in a few years, to such an extent as to defy competition and adulteration. Ordinary wines are easily imitated, but fine wines cannot be imitated by artificial means; neither can ordinary wines be flavored to equal fine wines. To change the vineyards of ordinary white wine grapes, I would recommend grafting in Johannisberg Riesling, Semillon Blanc, and Sauvignon Blanc. The Johannisberg Riesling is perhaps the finest of all white grapes, but is a very small bearer.

DISEASES OF THE VINE.

From general information and personal observation, I am pleased to report the absence of any alarming disease among the vineyards in Sonoma district, with the exception of phylloxera.

In Sonoma Valley the phylloxera has been found since the earliest knowledge of its existence in the State, and is slowly but surely advancing. It has reached within six miles east of Santa Rosa, where it has been found in one vineyard.

I am happy in being able to report that Mr. Dressell and others of Sonoma have proven beyond a doubt that the native wild vine of the Eastern States, *Vitis riparia*, thoroughly resists the phylloxera. Further, it is practically demonstrated that the grafting of fine European varieties on this resistant stock is a grand success.

CLIMATE.

The frost has occasioned considerable loss in some of the vineyards through the middle and southern portion of the county; the damage aggregates about 25 per cent. It is thus far impossible to estimate the damage by blight or coulure. I estimate the crop of 1887, 33 per cent less than was that of 1886. The northern part of Sonoma County escaped frost, and the crop prospect is reported to be fully as large as that produced in 1886.

A comparatively new district has recently been developed, known as Green Valley, lying on the lower part of the Russian River, adjacent to and among the redwood country west of Santa Rosa, where there are some of the finest and most promising young vineyards of the State. This section bids fair to have in the near future a reputation second to none other in the county.

The energetic and enterprising viticulturist, Guy E. Grosse, of Santa Rosa, has demonstrated the fact that there are thousands of acres of land in the

Sonoma District which, though at one time covered with brushwood and heavy undergrowth, and considered worthless, can now be classified among the best wine and fruit lands in the country. They need only proper clearing of brush and stone. The same lands now carry a value of from \$300 to \$500 per acre when worked into good condition for cultivation.

Number of Gallons of Wine Manufactured from Vintage of 1886.

Cloverdale	200,000
Geyserville	150,000
Healdsburg	200,000
Windsor	150,000
Fulton	40,000
Santa Rosa	500,000
Lay Clark & Co.	80,000
Hill, Korbell, Lehn, Torrance	100,000
Sebastapol	80,000
Petaluma	40,000
Glen Ellen	500,000
Los Gullicos	200,000
Sonoma	1,000,000
Bennett Valley	260,000
	<hr/>
	3,500,000
Tons of grapes	25,000

LAKE COUNTY.

There are quite a number of promising young vineyards in this county, and with the climate, adaptability and nature of the soil, Lake County will in the future be one of our first class wine counties.

MENDOCINO, AND OTHER COUNTIES.

Of Mendocino County I cannot obtain any positive information, but from what I have learned there is but very little attention given to vine culture. I can also report the same of Siskiyou, Humboldt, Trinity, and Del Norte. Marin County is slowly but surely increasing her vineyards.

Respectfully submitted.

I. DETURK,

Viticultural Commissioner for the Sonoma District.

ANNUAL REPORT
OF
GEORGE WEST,
Commissioner for the San Joaquin District, 1887.

STOCKTON, June 30, 1887.

To the Board of State Viticultural Commissioners :

GENTLEMEN: A review of the progress made in viticulture in this district since my last report is very gratifying. Two years ago the only counties that made any pretensions toward grape growing were San Joaquin and Fresno, while now the greatest interest is taken in viticulture throughout the whole San Joaquin Valley, and there has been an immense increase in the acreage both of wine and raisin grapes, notably in Fresno County.

SAN JOAQUIN COUNTY.

It has been impossible to obtain an exact estimate of the acreage planted in vines in San Joaquin County, for the reason that the lands were long since divided into comparatively small holdings, and as they are almost universally fine, and nearly all well adapted to grape growing, a great many small vineyards have been planted, the exact acreage of which has been impossible to obtain. However, I consider two thousand acres a low estimate; and I am pleased to note in this connection that nearly all the vineyards that have been planted in the past two years have been planted in the very choicest varieties of vines, the preference for wine grapes being for the Tannat, Cabernet Sauvignon, Cabernet Franc, Mondeuse, Verdot, Malbeck, St. Macaire, Petit Bouschet, Trosseau, and Mataro, for red wines; the Folle Blanche, White Prolific, Boal, and Colombar, for white wines and brandies. For table grapes, the Black Prince, Tokay, Emperor, and Black Ferrara are almost exclusively planted.

I would urge the planting of resistant stocks in all cases, the extra expense being amply repaid by permanency of the vineyard secured thereby.

PROSPECTS OF INCREASED ACREAGE.

It is probable that the coming winter will see a large increase in the acreage of vines, as the profits derived from the industry in this section are very satisfactory, the yield being phenomenally heavy, and the quality of the product excellent. San Joaquin County is so situated that both sweet and dry wines can be produced. No vineyards are planted in raisin grapes, for the reason that the season for drying is so short as to make the venture hazardous.

TABLE GRAPE.

Table grapes of a quality unexcelled are produced on the black lands around Stockton, and a considerable acreage is devoted to their culture. These grapes are mostly shipped to the eastern markets, and the profits

of the growers are very large. I look for wonderful developments in this branch of the industry. Lands can be purchased at from \$50 to \$150 per acre, according to location; and many of our wheat farms will be subdivided and sold at those figures during the coming winter.

No irrigation whatever is required for the growth of the vine in most parts of San Joaquin County; and wherever it is practiced unnecessarily it is at the expense of the quality of the product.

STANISLAUS AND MERCED COUNTIES.

Stanislaus and Merced Counties are just awakening to the importance of grape growing to the future developments of their lands. Both these counties contain a small acreage of old vines and a more considerable acreage of vines of recent plantation. Good wines have been made in both counties, and with the better varieties of vines now being planted we may reasonably expect an improvement in the product. Raisins of excellent quality will undoubtedly be produced, as the warm dry nights would seem especially adapted to the curing of the grape. Both of these counties contain countless acres of fine land, all of which has been devoted to wheat growing.

Several irrigation schemes are assuming definite shape, and a large amount of land will soon be placed on the market. It is probable that both Stanislaus and Merced Counties will make the same rapid advancement that has been made in the more southern county of Fresno.

FRESNO COUNTY.

No county in the district can show such wonderful development in so short a time as Fresno. At the time of my last report the acreage of this county was placed at seven thousand five hundred acres, while now it will be seen from the statistics appended to this report that nearly fifteen thousand acres are planted in raisin and wine grapes, of which nine thousand five hundred acres are in raisin grapes, the balance in wine grapes. The profits from both branches of the industry are satisfactory to the growers.

The vintage of last season amounted to about one million five hundred thousand gallons of wine, nearly all of which has been sold at remunerative prices. The vintage of 1887 will be much heavier as a large acreage of young vines will be in bearing. A large part of the young plant of Fresno County is devoted exclusively to port, sherry, and brandy varieties, it being generally conceded that the San Joaquin Valley will excel in these products. Fresno County will undoubtedly be the banner raisin-producing county of the State, the climate being exceedingly well adapted to the curing of the grape.

THE RAISIN INDUSTRY.

The raisin pack of 1886 was about two hundred and fifty thousand boxes, and the amount will be materially increased this season. The profits of the business are large and it is one particularly attractive to people of limited means, the heavy investments necessary to the wine business not being required. Many growers sell their products to the packers, in the sweat-boxes, and realize a handsome income from a small acreage of vines. An immense number of small vineyards will be planted this winter in raisin grapes throughout Fresno County.

A few years ago the only vineyards in the county were in the immediate

vicinity of Fresno City, but lately large tracts of land both north and south have been brought under irrigation and planted in vines.

The vineyards around Minturn and Madera, in the northern part of the county, are devoted almost exclusively to wine growing, while around Fowler, Selma, and Kingsburg on the south, the preference is given to raisins. Appended to this report will be found a complete list of the vine growers of Fresno County, together with the number of acres and varieties of vines planted by each. Had it been practicable I should have made a similar list from the other counties in my district, but the acreage of vines did not warrant the expenditure which would have been required to canvass so large a territory.

TULARE COUNTY.

Tulare County is at last realizing the fact that she has countless acres of fine land well adapted to grape growing, but it is only within the past three years that any important plantations have been made. There are probably eight hundred acres of vines in the county principally in raisin grapes, and as the conditions are similar, her products will undoubtedly equal those of Fresno in excellence.

Kern County also has planted a considerable acreage of vineyard in the past few years, and as a heavy immigration is pouring into the whole San Joaquin Valley, it will be but a short time before the wonderful resources of this county will be more fully developed. Regarding the future of the industry in general, I have no fears. Prices for grapes this season are very low, but I do not believe the depression will be of long duration.

The business of condensing must is in its infancy, and when fully developed will undoubtedly relieve the market of a large part of the surplus crop. Our principal trouble has arisen from the fact that our wines have been marketed too young, but I believe most growers will now hold them until they are properly matured, and sales in the East will be materially increased in consequence.

Respectfully submitted.

GEO. WEST,
Commissioner for the San Joaquin District.

ANNUAL REPORT
OF
L. J. ROSE,
Commissioner for the Los Angeles District, 1887.

LOS ANGELES, August 20, 1887.

To the Board of State Viticultural Commissioners:

GENTLEMEN: I have been unable to give to my district report the personal attention I might wish; but, for want of time and opportunity I have adopted the means recommended and provided for at a recent meeting of the Board, namely: that of employing some competent person in the district to assist in procuring whatever statistics might be available. These I take pleasure in offering. They form a brief but carefully prepared resumé of the present condition of the viticultural industry in the counties over which I have the honor to preside. I trust the same may prove acceptable as submitted herewith.

Very respectfully,

L. J. ROSE,
Commissioner for the Los Angeles District.

L. J. ROSE, *San Gabriel:*

DEAR SIR: At your request I have taken such available statistics as you have furnished, giving the acreage of vines in Southern California, and secured other information from the various counties, and also from the several vine-growing sections, from which I arrive at the inclosed report.

I have found it exceedingly difficult to get any information; the many letters written asking for information remained unanswered. I have interviewed many persons living in different sections of the country, and otherwise arrived at the inclosed report, which I respectfully submit, although with misgivings as to its accuracy.

Yours most obediently,

GEORGE RICE.

Notwithstanding the tendency throughout Southern California to subdivide large tracts into smaller ones, and smaller and some larger ones into lots, I find that the vine interest has not been neglected.

The planting of cuttings last season has been about seventeen per cent of all planted before. The planting has been of the choicest varieties that experience has shown to be the best. Better arrangements for making grapes into wine and brandy have been made and more attention given to details. The grape and wine growers are awake to the importance of the subject, and many expect to continue to make wine and make it most profitable.

The prospect for this year is exceedingly good with every assurance of a full crop. No damage has occurred on account of frost, *coulure*, or other

causes, excepting from some unknown disease that is doing some harm in the neighborhood of Anaheim and Orange, of which I speak further on.

This year's crop will be say ten per cent larger this than last season's, with the exceptions noted. All varieties seem to have done well. The Mission, as usual, loaded, the Zinfandel also continues to bear heavily; the same might be said of all varieties. The Muscat of Alexandria of course excelling in Orange, Santa Ana, and Riverside, and not succeeding along the foothills, where but very few have been planted.

SAN LUIS OBISPO COUNTY.

The planting of cuttings in this county has received quite an impetus the past season, and with better transporting facilities will continue to increase.

The acreage planted in 1885 and prior was	472
Consisting of Zinfandel 84 A., Berger 34, Muscat A. of 31, balance planted to Mission and Malvoisie.	
The planting of 1886-7 was about as follows: Zinfandel 20, Berger 10, Muscat 10, Mission and mixed 40, making.....	80
Total	552

Making an increase of nearly 20 per cent.

SANTA BARBARA COUNTY.

The total acres planted in 1885 and prior amounted to	900
About 35 per cent of this is in Muscat of Alexandria, one half of the remainder in Missions, the balance in Zinfandel, Berger, and scattering European varieties.	
The plant of 1886-7 was	225
Total	1,125

The present outlook is very good, and a full crop assured.

The report from this county was furnished by County Assessor, which he says is as near correct as is possible to give with data before him.

VENTURA COUNTY.

Information from this county was hard to get, more so than from others. From the best information I could get—

The number of acres planted in 1886 and prior was about	380
Planted in 1886-7, 20 per cent increase	76
Total	456

Missions predominating with Zinfandel and Muscats next. A much larger acreage is promised the coming season. "Ventura can make as good wine as can be made in the State," is the language of one of her intelligent citizens.

SAN DIEGO COUNTY.

This county is rallied around the bay, and the people are whooping up the real estate boom. Many beautiful valleys in the interior are awaiting.

Total acres planted 1885 and prior	774
Of this Muscat of Alexandria (raisins)	545
Missions	214
Roussillon type	14
Planting of 1886-7 20 per cent increase; of these 80 per cent were of raisin variety.	
Total acres	1,000

The raisins of El Cajon Valley are pronounced the best in the State: at least, the people of that section so claim, and there is no doubt about their superiority.

SAN BERNARDINO COUNTY.

1885 and prior, planted	3,470
Of these Muscat of Alexandria	1,844
Wine varieties make up the balance.	
The increase planted in 1886-7 has been 20 per cent	610
Total	4,080

Of the increase, 80 per cent has been of Muscats—this variety succeeding most admirable, especially at Riverside, where the bulk of all the raisins are grown.

LOS ANGELES COUNTY.

Acres 1885 and prior	15,560
Consisting of Mission and Malvoisie, 30 per cent; Muscat of A., 15 per cent; Zinfandel, 15 per cent; choice European varieties, 40 per cent.	
Planted 1886-7, less loss from disease and subdivision, 10 per cent.	1,560
Total acres	17,120

The disease mentioned appeared noticeable two or three years ago, in Orange and Anaheim, where the vines seem to die without cause. Professor Hilgard thought it must be some climatic trouble that would pass over in a short time.

Entire vines, roots and all, have been sent to scientific men in Washington, D. C., and to others, but no one so far has given a name or remedy.

That no phylloxera exists is certain, but this new disease, whatever it is, should have the attention of your viticultural authorities.

In submitting this report, I do so with misgivings, and you will sympathize with me when you understand the little help I have had, and the number of unanswered letters.

Your most obedient,

GEORGE RICE.

REPORT OF THE SECRETARY.

OFFICE OF THE BOARD OF STATE VITICULTURAL COMMISSIONERS, }
204 MONTGOMERY STREET, SAN FRANCISCO. }

To the Board of State Viticultural Commissioners:

GENTLEMEN: I respectfully report that the duties devolving upon the office of Secretary for the past year have been performed to the best of my ability.

A great many letters have been received from parties seeking information respecting all branches of viticulture, and all of them have been promptly answered or referred to responsible parties who could answer them. As the large planting of vines has been checked for the present, more letters were received from parties wishing to know how they could dispose of their products at a profit than from parties asking information as to what varieties of vines they should plant. It is the wish of the majority of producers that this Commission will devise some plan to help them find a market for their products.

The demand for the reports of the Commission has been a constant one. The supply of Appendices I, II, III to the Second Annual Report of the Chief Executive Officer is nearly exhausted, and I would recommend that a new edition be published, as the information contained in them is so valuable that they will be always in demand. A great many applications for reports have been received from the Eastern States, Mexico, Europe, and Australia. In Australia the reports have been greatly appreciated, and I have just received word that a Board of Viticulture in Victoria has been brought into existence by that Government in a similar way that this Board was created by our Legislature.

During the past year Chief Executive Officer Wheeler has instituted a new plan of sending out appendices to his annual report on subjects of immediate importance to vineyardists. The reports of the Commissioners, as fast as received, were also published and sent out. The mailing of so many pamphlets has greatly increased the work of this office, as our mailing list has increased during the year fully one third, and now contains over six thousand names.

I have devoted considerable time to the compiling of a new directory of grape growers and wine makers of California, and as soon as completed will have it published for distribution. I will then endeavor to obtain the acreage in vines and varieties planted, from each person whose name will appear in the directory.

The gathering of accurate statistics is a very difficult one, owing to the State being so large, and the unwillingness of so many vineyardists to give the information asked for. During the year 1886, Mr. F. W. Morse, of the State University, was employed by this Commission to gather viticultural statistics. After working several months he obtained very complete statistics from some counties, while from others he obtained but little. During the past year, by order of this Board, each Commissioner was allowed to expend a sum not to exceed \$150, in collecting statistics for his annual report. Some of them used this amount, or part of it, and so added greatly to our statistical information.

In order to obtain accurate information respecting the crop of 1887, I sent out in July a circular to our Inspectors and other persons throughout the State, asking them to answer the following questions:

First—What is the estimated damage to the grape crop by frost?

Second—What is the estimated damage to the grape crop by coulure?

Third—What is the loss by disease or other cause (naming the disease)?

Fourth—How will this year's crop in your vicinity compare with that of 1886, new vineyards included?

Fifth—What varieties will produce a full crop?

Sixth—What varieties will produce a light crop, and why?

To these circulars I received, by August first, one hundred and fifty-one replies, and was able then to estimate the wine crop of 1887 at sixteen million gallons, and the raisin crop at seven hundred and fifty thousand boxes. At the time I made that estimate I was criticised severely by one newspaper for having put the crop so low, but the final result of the vintage did not vary very much from those figures. I shall follow the same plan in the future, and hope by the first of August of each year to be able to give an accurate estimate of that year's crop.

After the passage of the State Pure Wine Bill the work of this office was materially increased, owing to the great number of wine samples received to be analyzed for adulterations. All of the samples, upon receipt, were numbered, and a record of the number, the sender's name, and a description of the wine was kept in this office. The samples were then sent to Prof. W. B. Rising, State Analyst. Upon receipt of the analysis a copy of it was sent to the party sending the sample, and a duplicate of it retained in this office.

EXPERIMENTAL CELLAR.

At the session of the Legislature in 1885 the following appropriation bill was passed:

For viticultural, experimental, scientific, and analytical work, including apparatus and suitable accommodations for the same, under control of the Board of Regents of the State University and the Board of State Viticultural Commissioners, ten thousand dollars.

This appropriation gave this Commission the use of \$2,500 for the year July 1, 1885, to July 1, 1886, and \$2,500 for the year July 1, 1886, to July 1, 1887.

At the same session of the Legislature the office of State Analyst was created, and Professor W. B. Rising, of the State University, was appointed State Analyst. As no appropriation was made for carrying on the work of the State Analyst, the Commissioners decided that the best use they could make of the above money was to carry on analytical work at the office of the State Analyst, and to establish an experimental cellar in this city.

To carry on the analytical work required by this Board the State Analyst was compelled to employ an assistant, and the Board agreed to pay the salary of such assistant, and also to purchase such apparatus as was necessary.

In this city a cellar, situated on the corner of Clay and Leidesdorff Streets, was rented, in which the Commission could store samples of wines from different portions of the State, and also the samples made by this Commission. The cellar was then fitted up, and a committee consisting of Messrs. De Turk, Wetmore, and Krug was appointed to look after the interests of said cellar, and to select suitable wines to be stored in it.

A great many vineyardists throughout the State have of late years been planting new varieties of grapes in order to see the kind of wine that can

be produced from them. Such samples of wines have, in most cases, been sold with the balance of wine in the cellar, or the vineyardist has been financially forced to sell them, and the identity of the wine has therefore become lost. The committee, knowing the value of having such samples stored in this city, where the temperature is uniform throughout the whole year, selected from different portions of the State such samples as they thought would be of interest to keep, in order to show what such wines would be when three, four, or five years old. They obtained a barrel each of *Cabernet and Verdot*, *Cabernet and Merlot*, *Cabernet and Tannat*, *Tannat*, *Petite Syrah*, *Mondeuse*, *Meunier*, *Mataro*, *Carignan*, *Beclan*, *Zinfandel*, *Chauché Noir*, *Petite Pinot*, *Sauterne*, *Johannisberg Riesling*, *Franken Riesling*, *Semillon*, *Chauché Gris*, *Fehér Szagos*, brandy, and port. Most of the wines are of the vintage of 1886, and at the present time are in good condition and improving well. As soon as the wines are ripe enough, they will be clarified and put into bottles.

SHERRY.

To test the values of certain varieties of grapes for sherry, a small room was fitted up, and heated by means of a gas stove, and the temperature kept up to 112° Fahr. Into this room small samples of wines were put and kept there for three months. The varieties put in were *Golden Chasselas*, *Boal*, *Sauvignon Vert*, *Verdelho*, and *West's White Prolific*. Before putting the samples into the hot room, they were all fortified, so as to contain 18 per cent alcohol. The samples are all developing well, especially so the *Golden Chasselas*, *Boal*, and *White Prolific*. In the cellar some *Golden Chasselas* wine was put into barrels, and left to make sherry by the natural way. Being a cool cellar, it has developed very slowly.

The looking after the samples in the cellar, such as racking, ulling, etc., has been a portion of my work, and I have given it all the time I could spare from my duties in this office. To do the rough work, I have employed a man at odd times, paying him \$2 per day for the time he worked. The expenses, therefore, of taking care of the samples has not been very heavy, being \$25 per month for rent of cellar, and from \$6 to \$12 per month for labor.

BRANDY.

To test the value of the Folle Blanche grape for brandy purposes, I obtained two hundred pounds of fresh grapes from Mr. S. Osterhout, of Livermore, and fermented them in the back room of the office, and afterward distilled the wine in a small still that belongs to this Commission. The result was a few gallons of excellent brandy of true cognac type, which is now pronounced by all brandy experts as equal to the imported cognac of the same age. The Folle Blanche grape can therefore be recommended to all parties wishing to plant a vineyard for the purpose of making a fine brandy of cognac type.

LIBRARY.

I have just completed a catalogue of the books in our library, which same I hand in to be published with this report.

Our library now contains four hundred and twenty-one volumes, consisting of nearly all of the standard works on viticulture and viniculture in the French and English languages. A number of German books will soon be added. No one has been permitted to take books from the office, but all persons have been cordially invited to visit our rooms and make use of

the library during office hours. A great many persons, during the past year, have availed themselves of this privilege.

I also hand in my report on finance, and a copy of the minutes of the meetings held during the year.

Respectfully submitted.

CLARENCE J. WETMORE,
Secretary.

FINANCIAL REPORT.

SAN FRANCISCO, December 31, 1887.

Board of State Viticultural Commissioners:

GENTLEMEN: I respectfully submit the following report of receipts and disbursements for the year ending December 31, 1887, as taken from the books in this office:

<i>Receipts.</i>		
Balance unexpended December 31, 1886	\$7,250 88	
Appropriation for the fiscal year ending July 1, 1888	15,000 00	
		\$22,250 88
<i>Disbursements.</i>		
Office expenses	\$3,146 76	
Salaries of Chief Executive Officer and Secretary	3,583 32	
Experimental work	222 01	
Reports	25 84	
Traveling expenses Chief Executive Officer	72 65	
Traveling expenses Commissioners	111 90	
Expenses of conventions	396 50	
Library	143 00	
Work done outside of State	600 48	
Distributing information	235 25	
Experimental cellar	1,352 69	
Expenses office of State Analyst	607 35	
Statistics	481 80	
		\$10,979 55
Balance unexpended		\$11,271 33

CLARENCE J. WETMORE,
Secretary.

SESSIONS OF THE BOARD OF STATE VITICULTURAL COMMISSIONERS.

OFFICE OF THE BOARD OF STATE VITICULTURAL COMMISSIONERS,)
204 MONTGOMERY STREET, SAN FRANCISCO, January 15, 1887.)

A special meeting of the Board was held on the above date, and was called to order at eleven o'clock A. M., by President Haraszthy. The following Commissioners were present: Haraszthy, Wetmore, Krug, Shorb, DeTurk, and West, and Secretary J. H. Wheeler.

Under the head of correspondence, a communication was read from Jas. H. Reall, President of the National Agricultural and Dairymen's Association, addressed to Commissioner Wetmore, as one of the committee appointed

by that body for the Pacific Coast. This communication notified the Board of a National Convention to be held in New York about February 8, 1887, to be followed by a banquet to representative agriculturists, Congressmen, Senators, Governors, and other leading men. This communication further invites participation, and requests that this Commission select proper California wines for use on this occasion.

Another letter addressed to Mr. Wetmore was read, referring to the American Exhibition at London, a matter considered at a previous meeting of the Commission. The writer, Mr. H. E. Hamilton Wormey, urged the value of an exhibit of California wines and the early appointment of a proper representative of the interest. He further indicated valuable means of introducing California wines abroad, and a willingness to render whatever assistance lay within his power.

A communication was also read from Hon. Green B. Rain, special attorney for the Commission at Washington, relating to the progress of the *Sweet Wine Bill*.

The Secretary then read the following communication:

ALBION H. WETMORE, President, State Viticultural Commission:

DEAR SIR: I desire to resign my resignation as Chief Executive Officer, to take effect as soon as the State Commission can hold a meeting to consider the same and considering the appointment of a successor. I wish the members of the Board to understand that I am deeply indebted to them for their continued expressions of confidence in the integrity of my work and that I am grateful for the high honors which they have conferred on me; but circumstances force me to prefer now to devote the larger part of my time to my private affairs. As a member of the Commission I shall have abundant opportunity to cooperate with you in the future to the extent of my ability without serious embarrassment in private life.

Respectfully yours,

CHAS. A. WETMORE.

Mr. Shorb earnestly urged Mr. Wetmore to withdraw the resignation; the other members expressed the same wish. A letter was read from Commissioner Rose, addressed to the Secretary, requesting the Commission not to accept Mr. Wetmore's resignation, and urging him to withdraw it. A motion was then made by Mr. Krug and carried, that action on the resignation be deferred for four weeks.

Mr. Shorb then offered the following resolutions, which were unanimously adopted:

Resolved, That on behalf of the vine growers of this State, the thanks of the Commission are tendered to all the Senators and Representatives of this State, in respect to their united efforts to secure favorable legislation on viticultural matters. Also to Senator John P. Jones and his colleagues on the Finance Committee for their assistance; also to Hon. Wharton J. Green, of North Carolina, for his special efforts against pure wine legislation.

Resolved, further, That the Secretary of this Commission be instructed to communicate with Mr. Green with respect to his bill taxing spirits, etc., and to cause the provisions were now being examined carefully, and that some modifications might be suggested by this Commission, which it is believed will further improve it, strengthen the measure both before the people and Congress, and prove satisfactory to honest producers throughout the United States.

Mr. West then moved that a sum of \$500, from the funds of the Commission, be voted to Mr. G. W. Wilson to compensate him for services performed at Washington in behalf of California on the sweet wine measure. Said payment to be made contingent upon the passage of a measure. The motion was carried unanimously.

On motion of Mr. DeTuck, Mr. B. F. Clayton was engaged as agent for the Commission in New York to assist in legislation now pending in Washington, and that he be paid for such services \$500 from the funds of the Commission.

The Board then took a recess until Monday, January seventeenth.

On resuming session Monday at one o'clock P. M., a letter was read from C. B. Gerletti, Secretary of the "Società dei Viticoltori Italiani" at Rome, a society formed for the purpose of encouraging viticulture and oenology in Italy, particularly as relating to the exportation and sale of Italian wines. With this letter was received the first report of this Italian Commission, and asking in return the reports of this Commission, and hoping that the most amicable relations might arise and continue between the two organizations.

The following letter was then read:

PHILADELPHIA, January 10, 1887.

CAS. A. WETMORE, Esq., Chief Executive Officer, San Francisco, California:

DEAR SIR: Cannot something be done in your State to exhibit its wonderful resources in the production of wine before the Europeans who will attend the American Exhibition in London next summer—probably ten millions of visitors.

The wine producers of the East are going to exhibit, and certainly California has more at stake than all the eastern vineyards collectively. I inclose you circulars A, B, H, and I and I send you a copy of the official journal.

Yours respectfully,

BURNET LANDRETH,
Director for the United States.

With reference to the above communication, Mr. Shorb offered the following resolutions, which were adopted:

WHEREAS, This Commission has been invited to participate on behalf of vine growers, in the American Exhibition at London, which proposes to offer an opportunity for representatives of American products to extend their commercial advantages; and whereas, by the appointment of a Commissioner by the Governor of this State, this enterprise has received State recognition; therefore,

Resolved, That this Commission does hereby tender to Mr. C. B. Turrill an appointment as special Commissioner to take general charge of an exhibit of wines, brandies, raisins, and other viticultural products, to be collected and forwarded in behalf of vine growers, especially with the intention of stimulating the expansion of our markets and to enable producers to secure new customers, providing that said appointment shall be subject to the action of the Legislature in providing a special appropriation to defray the expenses of such exhibit; and,

Resolved, That our Secretary be instructed to communicate with Mr. Turrill to ascertain whether he will accept the office tendered.

Concerning the reduction in tariff on raisins, which the Spanish producers are now asking for, Mr. West offered the following resolution, which was unanimously adopted:

Resolved, That the present tariff on raisins is too low to permit, in ordinary years of large importations, fair competition of American producers against the products of cheap foreign labor, and that the former resolutions of this Board, urging Congress to increase the tariff in this respect, be reiterated; also, that our Senators and Representatives in Congress be requested to use their influence to resist any attempt to reduce the same.

The Board then accepted the invitation of Jas. H. Reall to attend to the representation of California at the Convention and banquet to be held in New York under the auspices of the National Agricultural and Dairymen's Association, and they agreed to furnish California wines for the banquet. The Secretary was also instructed to communicate with our Senators and Representatives in Congress, and to request them to attend the Convention in behalf of the vine growers of California.

Professor Rising, State Analyst, then presented his report on analyses made for the Commission, of certain native and foreign wines, coloring matters of commerce, tannic solutions, etc.

The meeting then adjourned, subject to the call of the President.

J. H. WHEELER,
Secretary.

OFFICE OF THE BOARD OF STATE VITICULTURAL COMMISSIONERS, }
 204 MONTGOMERY STREET, SAN FRANCISCO, February 14, 1887. }

An adjourned meeting of the Board was held on the above date, for the purpose of considering the resignation of the Chief Executive Officer.

There being no quorum present, the meeting was then adjourned to March 8, 1887.

J. H. WHEELER,
 Secretary.

OFFICE OF THE BOARD OF STATE VITICULTURAL COMMISSIONERS, }
 204 MONTGOMERY STREET, SAN FRANCISCO, March 8, 1887. }

An adjourned meeting of this Commission was called to order by the President, on the above date, at half-past one o'clock p. m. The following Commissioners were present: Messrs. Haraszthy, Shorb, Krug, West, Wetmore, and Manlove.

On motion of Mr. Wetmore, the Secretary was instructed to forward resolutions of sympathy and regret to the relatives of the late Louis Grandjean, who has, for some time past, acted as assistant to the State Analyst.

On motion of Mr. West, the Secretary was instructed to extend a vote of thanks to Senator L. J. Rose, for the able assistance rendered the viticultural industry by him at the present Legislature. Also, that the Secretary tender the acknowledgment of the Board to Mr. B. F. Clayton, for work performed by him at Washington, and for the general interest that he has developed in California viticulture throughout the East in his efforts made in behalf of the sweet wine measure.

The following resolution was then offered by Mr. Shorb, and unanimously carried :

Resolved, That the action of Hon. C. N. Felton, together with the entire delegation of California in Congress, in refusing to accept the Conference Committee report on the Sweet Wine Bill, is hereby commended, and that the thanks of our vine growers should be tendered for the jealous watchfulness of our interests.

President Haraszthy was appointed a committee of one to communicate to the Grape Growers and Wine Makers' Convention, now in session, the action already taken by this Board relative to the London Exhibition, with the request that the association now take the matter in hand to conduct a California exhibit as they may see fit.

The resignation of the Chief Executive Officer was then considered, and by resolution adopted made a special order for a meeting to be held the following day, March 9, 1887, at eleven o'clock a. m., and Messrs. Haraszthy, Shorb, and Krug were appointed a special committee to report on the subject.

Adjourned.

J. H. WHEELER,
 Secretary.

OFFICE OF THE BOARD OF STATE VITICULTURAL COMMISSIONERS, }
 204 MONTGOMERY STREET, SAN FRANCISCO, March 9, 1887. }

The adjourned meeting of the Board was called to order by the President, at eleven o'clock a. m. Present—Commissioners Haraszthy, Wetmore, Krug, Shorb, West, and Manlove.

A communication was read from Mr. DeTurk, at this time in the East, asking that an Auditor be appointed to serve in his absence. The President appointed Dr. W. S. Manlove.

On motion of Mr. Krug, the Secretary was instructed to prepare a resolution of thanks to Assemblyman Coombs, Chairman of the Assembly Viticultural Committee at the last Legislature, for services rendered to viticultural interests.

The special committee appointed at the meeting yesterday to consider the matter of the resignation of Mr. Wetmore, as Chief Executive Officer, here presented their report, which read as follows:

Resolved, That the State Board of Viticulture accept with most profound regret the resignation of its Chief Executive Viticultural Officer, Charles A. Wetmore; that a vote of appreciative confidence and thanks is hereby tendered to Mr. Wetmore for his untiring energy, his unflinching zeal and enthusiasm, for his unselfish and single-minded purpose in promoting the best welfare of viticulture in California. That we have ever found him a faithful, conscientious, hard working, and efficient officer, and that to him more than to any one else is due the present high standard of excellence and widespread good reputation of our California wines. That in his resignation we see a public calamity to the best interests of our State, and especially to the whole immediate future development of viticulture in California.

ARPAD HARASZTHY,
J. DEBARTH SHORB,
CHARLES KRUG,
Committee.

The report of the committee was accepted by a unanimous vote, and the Secretary was specially directed to enter the same in full on the minutes.

In response, Mr. Wetmore thanked the members of the Board for the liberal assistance they had given him in the administration of the duties of his office, and made especial reference to the deep gratitude he felt for the marked unanimity of their support.

The resignation of J. H. Wheeler, as Secretary of the Board, was then read and accepted, and Clarence J. Wetmore was elected by unanimous vote in his stead.

Mr. West then nominated Mr. J. H. Wheeler for Chief Executive Officer of the Board. There being no other nominations, Mr. Wheeler was unanimously elected.

Mr. Wetmore moved the establishment of a viticultural station at Mr. H. W. Crabb's vineyard, in Napa County, for the special propagation of and experimentation with new varieties of grapes for the determination of their value. Also for testing the value of certain resistant stocks, and also that Mr. Crabb be appointed to superintend such station and work. Seconded by Mr. Krug, and carried.

The President then appointed Dr. W. S. Manlove, who was appointed as Commissioner vice R. B. Blowers, on the Committee on Vine Pests and Diseases of the Vine, and also on the Committee on Raisins and Table Grapes.

The action taken yesterday in appointing President Haraszthy a committee of one to confer with the Vine Growers and Wine Makers' Convention, relative to the London Exhibition, was reconsidered, and the following committee was appointed to confer with the railroad companies, requesting their coöperation in the matter of a California exhibit of viticultural products at the coming London Exhibition: Messrs. Manlove, Wetmore, and Haraszthy.

President Haraszthy then announced a call for the yearly reports of the Commissioners, and said that he should expect them to be handed in on or before the next regular meeting of the Board, to be held in June.

On motion of Mr. Krug, each Commissioner was allowed to incur an expense not to exceed \$150 in procuring statistics for said report.

Mr. Haraszthy announced that he would endeavor to present, as Commissioner at Large, a report on the increase and aggregate values of products and properties other than direct investment in lands, vines, and first planting of vineyards, that have developed by the viticultural industry in California. He also announced that he should call upon Mr. Shorb, the other Commissioner at Large, for a report on the influence of the development of viticulture on the real estate values of the State.

The meeting then adjourned.

J. H. WHEELER,
Secretary.

OFFICE OF THE BOARD OF STATE VITICULTURAL COMMISSIONERS, }
204 MONTGOMERY STREET, SAN FRANCISCO, June 13, 1887. }

The regular semi-annual meeting of the Board was called to order on the above date, at eleven o'clock A. M., by President Haraszthy. The following Commissioners were present: Messrs. Haraszthy, Wetmore, DeTurk, Krug, and Manlove.

The minutes of the previous meetings were read and approved.

A communication from Dr. J. A. Bauer to Chief Executive Officer Wheeler was then read. The communication contained an account of his success with the mercurial remedy for destroying the phylloxera. The communication was received and placed on file, and Mr. Krug was appointed a committee of one to examine this experimental plot in Mr. Hagen's vineyard, and to request Mr. H. W. Crabb and the Chief Executive Officer to accompany him, to verify the truth of the above report. The Chief Executive Officer was also instructed to visit the experimental plot treated by the Commission in Sonoma with the mercurial remedy, and to report the success to the Commission at its next meeting.

Mr. Wetmore reported that in some places in the south the vines were dying with sunstroke, the same disease that he had reported on last year.

The Chief Executive Officer reported that he had received a great many letters about various insect pests doing more or less damage to the grapevines; also, that he had made experiments at Crabb's Station with Paris green and arsenic, to determine how much could be used without injury to the vines and the fruit. The report on the same will be made later.

Mr. Wheeler then read a letter from Mr. Arthur Rodgers, Regent of the State University, asking what help the Commission would want from the Regents of the University in reference to aiding the State Analyst. Prof. W. B. Rising, being present, reported that his office was being crowded with samples to be tested for purity, and that in order to finish them up without delay he needed more help.

On motion, Professor Rising was requested to make out an estimate of the expenses of his office for the next year, and that he and the Chief Executive Officer confer with the Board of Regents of the State University and see what they will be willing to do, and to report the same to the Executive Committee of this Commission as soon as possible.

Dr. W. S. Manlove then offered the following resolution, which was unanimously adopted:

Resolved, That the Chief Executive Officer be instructed to issue a circular to Local Resident Inspectors throughout the State, calling upon them to report promptly whenever they discover any violations of the Pure Wine Law in the use of materials forbidden by that law in the manufacture of wines sold as pure.

Mr. Haraszthy, from the committee appointed at the last meeting to confer with the railroad companies in reference to the London Exhibition, reported that he had conferred with the managers of the Southern Pacific, and requested the Secretary to read the following letter which he had received:

NEW YORK, May 4, 1887.

ARPAD HARASZTHY, *President State Viticultural Commission, San Francisco, California:*

DEAR SIR: Yours of the twenty-sixth ultimo is received relative to the participation of your Commission in any representation which may be made by this company through Major Truman at the London Exposition.

In answer I will say that it is not definitely determined to send Major Truman to London on that business, but if any one goes it will be he. There have been, from time to time, doubts in circulation as to whether the Exposition would be a success or a failure, and it may require him to go over and see for himself before embarking much money in the venture.

We shall not make any exhibit of California products ourselves, and if we appear there at all it will be a sort of missionary work to make known the advantages of California, in order that we may derive some indirect benefit from it by the attractions for settlers and tourists. The outlay will be certain, but the returns will be conjectural. However, if we conclude to go any further in the matter, we agree with you that the Major would be as good a representative as we could find, and his connection with the railroad companies would help rather than hinder his efforts to serve your association. I suppose it will be proper in that event that the association should bear a certain proportion of his expenses outside of the printing which each interest would provide at its own expense. On this basis there would be no objection to coöperation.

Yours, very respectfully,

C. P. HUNTINGTON,
Vice-President.

On motion the communication was placed on file.

Mr. Wetmore then offered the following resolution, which was seconded by Mr. Krug, and unanimously adopted:

Resolved, That the Secretary be instructed to call upon Miss Kate Field and present the thanks of the vine growers for the lively interest she has shown in the development of legitimate American wine industries, and to confer with her with a view to securing further active work in popularizing, throughout the Eastern States, correct information concerning the rational use of wine.

In regard to the damage done by frost, Mr. DeTurk reported that in his section the frost had skipped about considerably and had done some damage. In Green Valley the frost had done no damage; also, the vineyards about Cloverdale were not injured. Near Santa Rosa, Glen Ellen, and in Los Guilicos Valley, the vines had been damaged to a considerable extent.

Dr. Manlove, Commissioner for the Sacramento District, reported that the frost had done a great deal of damage to some of the vineyards in his district, but that the Natoma Vineyard had escaped, owing to the smoking of the vineyard.

Mr. Krug, from the Napa District, reported that his Rieslings, trained on wires, had suffered a great deal from the frost, and that where he got last year twelve to thirteen tons to the acre, he would not get three tons this year. He considered that Napa Valley was good for two thirds of a crop this year.

Estimates were then made as to the total amount of wine that would be made in the State, and they varied from fifteen million to twenty-two million gallons.

The last Legislature failing to make any appropriation for analytical and experimental work, the Commission decided to keep on with its work at the experimental cellar, and to pay the expenses of the same out of the regular appropriation of the Board. The President then appointed Messrs. DeTurk, Wetmore, and Krug, a special committee to select wines from different portions of the State to be put in the experimental cellar for aging.

The election of officers for the ensuing year then took place, resulting as follows: President, Arpad Haraszthy; Vice-President, Chas. A. Wetmore; Treasurer, Chas. Krug; Secretary, Clarence J. Wetmore; Chief Executive Officer, J. H. Wheeler.

The President then appointed the following committees: Executive Committee, DeTurk, West, and Manlove; Auditing Committee, Dr. W. S. Manlove; Finance Committee, Rose and Shorb; Vine Pests and Diseases of the Vine, DeTurk, West, and Manlove; To Confer with the Board of Regents, Haraszthy, Wetmore, and Krug; Distillation, Counterfeits, and Adulterations, Shorb, West, and Krug; Raisin and Table Grapes, West, Rose, and Manlove; Instructions for Office of Chief Executive Officer, Haraszthy, Krug, and DeTurk; Compensation to be Paid Chief Executive Officer, Krug, DeTurk, and West.

The meeting then adjourned.

CLARENCE J. WETMORE,
Secretary.

OFFICE OF THE BOARD OF STATE VITICULTURAL COMMISSIONERS, }
204 Montgomery Street, San Francisco, December 12, 1887. }

The regular semi-annual meeting of the Board was called to order on the above date at eleven o'clock A. M., Arpad Haraszthy in the chair. The following Commissioners were present: Messrs. Haraszthy, Krug, DeTurk, Rose, and West.

Minutes of the previous meeting were read and approved.

Commissioner Krug, Chairman of the committee appointed at the last meeting to examine the vineyard of Mr. Hagen, at Napa, and to report on the Bauer mercurial remedy, reported that he had made an examination of the vineyard, in company with Dr. H. W. Crabb and the Chief Executive Officer, and that they had found that the remedy was a complete failure. He also reported that the Riparia vines in that vineyard were doing remarkably well; that the Lenoir were doing fairly well, and the California poorly.

The Chief Executive Officer reported that he had written a letter to the Board of Regents, asking that body to render some assistance towards paying the expenses of the State Analyst, but that he had received no answer to it. Also, that he had sent out, as directed, a circular letter to the Inspectors, asking them to report any violations of the Pure Wine Law that came under their observation, and that so far he had received no reports.

The following letter was then read from Senator George Hearst:

SAN FRANCISCO, October 22, 1887.

ARPAD HARASZTHY, Esq., President State Board of Viticulture, San Francisco, California:

DEAR SIR: The time of meeting of the Fiftieth Congress is rapidly approaching, and such measures as it is desirable to bring before that body should be ready for introduction at an early date of the session. I am desirous of receiving such suggestions from your Board as will enable me to assist in supporting any legislation required by the viticultural interests of this coast. I shall feel under obligations if you will indicate in what way those interests may be subserved by Congress. Please accompany such suggestions with such statistics and other information as will aid in the accomplishment of the desired results. If there are any special measures you desire introduced, I shall take pleasure in introducing them, or in seconding the efforts of others who may be selected to do so. Please furnish me with your annual reports for the past three or four years, and any other documents which you may have bearing upon the viticulture of the State.

I am very respectfully,

GEORGE HEARST.

On motion, the letter was placed on file.

A communication was then read from Commissioner Wetmore, offering many valuable suggestions on national legislation required for the viticultural industry. These suggestions were discussed at great length, and from them the following resolutions were finally adopted by a unanimous vote of the Board:

1. *Resolved*, That any decrease in the tariff on imported wines and brandies would be detrimental to our industry and should be vigorously opposed.

2. *Resolved*, That it is the sense of this Board that the wine makers of the United States, producing sweet wines, should be permitted the use of grape spirits, free of tax, for that purpose, but that no other than grape spirit should be permitted in the manufacture of such sweet wines without paying the usual tax.

3. *Resolved*, That all fruit juices compounded with alcohol, be classed as alcoholic compounds and taxed as such, and that a special effort to secure a revision of the tariff in this respect should be made without delay.

4. *WHEREAS*, The bonding period of three years has been found entirely inadequate to the necessities of maturing our brandies and finding a market for the same; and, further, that it being entirely impossible to know in advance the varying requirements of trade regarding the capacity of casks; therefore, be it

Resolved, That we petition our Senators and Representatives in Congress to secure for us a bonding period to extend to five years, and the privilege of breaking packages in bond, under proper regulations, into such sizes as the trade may require.

5. *Resolved*, That this Commission indorse the spirit and intention of the Pure Wine Bill, introduced by Hon. Wharton J. Green, of North Carolina, at the last session of Congress, and if any bill to protect genuine wines is to be presented this session, it should be in conformity with that bill.

6. *Resolved*, That the present tariff on raisins is too low to permit, in ordinary years of large importations, fair competition of American producers against the products of chief foreign labor, and that the former resolutions of this Board, urging Congress to increase the tariff in this respect, be reiterated. Also, that our Senators and Representatives be requested to use their influence to resist any attempt to reduce the same.

7. *Resolved*, That the Secretary of this Board be hereby instructed to forward a copy of these resolutions to Senator Hearst and to the other members of the California Delegation at Washington.

The following resolution, offered by Mr. Krug, was unanimously adopted:

Resolved, That in the present ruling of the Supreme Court in the case of *People vs. Kohler*, a test case to determine the validity of the Pure Wine Law, this Board finds cause for regret in that the beneficial effects expected from that law, in protecting the purity of California wines, were frustrated by the decision of the said Supreme Court on account of a construed miswording of said law.

Section 8 of said law reads as follows: "It is desired and required that all and every grower, manufacturer, trader, handler, or bottler of California wines, when selling or putting up for sale any California wine, or when shipping California wine to parties to whom sold, shall plainly stencil, brand, or have printed where it will be easily seen, first, 'Pure California Wine,' and secondly, his name or the firm's name, as the case may be, both on label of bottle or package in which wine is sold and sent; or he may, in lieu thereof, if he so prefers and elects, affix the label which has been provided for in Section 7."

Now, whereas, we recognize that there may be just grounds for the ruling of the Supreme Court in deciding that this clause may not be considered mandatory, yet we believe that a liberal construction, based upon the ordinary understanding of this portion of Section 8, would make it mandatory, conformant to what we know to have been the intention of the framers of said law; further, that the Board agrees that the purity of California wines can only be protected by the passage of a national wine law.

On motion of Mr. Rose, the Commission decided to hold a State Convention in the spring, and the time and arrangements for the same were left to the President and the Chief Executive Officer.

A letter was then read from Dr. E. J. Fraser, asking the Commissioners to examine some samples of wine treated with electro-magnetism, and to report on the same. The President appointed the following committee to examine the wines: Messrs. Rose, DeTurk, and West. This committee examined the wines and requested Dr. Fraser to present samples to the wine committees which will be appointed at the next Convention.

The meeting then adjourned.

CLARENCE J. WETMORE,
Secretary.

CATALOGUE OF BOOKS IN LIBRARY OF THE STATE VITICULTURAL COMMISSION.

No.	Title of Book.	Author.
1	Pomologie Générale, tome 1	A. Mas.
2	Pomologie Générale, tome 2	A. Mas.
3	Pomologie Générale, tome 3	A. Mas.
4	Pomologie Générale, tome 4	A. Mas.
5	Pomologie Générale, tome 5	A. Mas.
6	Pomologie Générale, tome 6	A. Mas.
7	Pomologie Générale, tome 7	A. Mas.
8	Pomologie Générale, tome 8	A. Mas.
9	Pomologie Générale, tome 9	A. Mas.
10	Pomologie Générale, tome 10	A. Mas.
11	Pomologie Générale, tome 11	A. Mas.
12	Pomologie Générale, tome 12	A. Mas.
13	Le Verger, tome 1	M. Mas.
14	Le Verger, tome 2	M. Mas.
15	Le Verger, Part I, tome 3	M. Mas.
16	Le Verger, Part II, tome 3	M. Mas.
17	Le Verger, tomes 4 and 5	M. Mas.
18	Le Verger, tome 6	M. Mas.
19	Le Verger, tome 7	M. Mas.
20	Le Verger, tome 8	M. Mas.
21	Le Vignoble, tome 1	Mas and Pulliat.
22	Le Vignoble, tome 2	Mas and Pulliat.
23	Le Vignoble, tome 3	Mas and Pulliat.
24	Encyclopédie de L'Agriculteur, tome 1	
25	Encyclopédie de L'Agriculteur, tome 2	
26	Encyclopédie de L'Agriculteur, tome 3	
27	Encyclopédie de L'Agriculteur, tome 4	
28	Encyclopédie de L'Agriculteur, tome 5	
29	Encyclopédie de L'Agriculteur, tome 6	
30	Encyclopédie de L'Agriculteur, tome 7	
31	Encyclopédie de L'Agriculteur, tome 8	
32	Encyclopédie de L'Agriculteur, tome 9	
33	Encyclopédie de L'Agriculteur, tome 10	
34	Encyclopédie de L'Agriculteur, tome 11	
35	Encyclopédie de L'Agriculteur, tome 12	
36	Encyclopédie de L'Agriculteur, tome 13	
37	Maison Rustique du XIX Siècle, tome 1	
38	Maison Rustique du XIX Siècle, tome 2	
39	Maison Rustique du XIX Siècle, tome 3	
40	Maison Rustique du XIX Siècle, tome 4	
41	Maison Rustique du XIX Siècle, tome 5	
42	Etude des Vignobles de France, tome 1	J. Guyot.
43	Etude des Vignobles de France, tome 2	J. Guyot.
44	Etude des Vignobles de France, tome 3	J. Guyot.
45	Viticulture de l'est de la France	J. Guyot.
46	Viticulture du sud-ouest de la France	J. Guyot.
47	Culture de la Vigne	J. Guyot.
48	Guide du Fabricant d'Alcools, tome 1	N. Bassett.
49	Guide du Fabricant d'Alcools, tome 2	N. Bassett.
50	Guide du Fabricant d'Alcools, tome 3	N. Bassett.
51	La Fermentation	N. Bassett.
52	De la Culture des Vignes dans le Médoc	A. D'Armailhaq.
53	La Vigne	Petit-Lafite.
54	Traitement des Vins, tome 1	R. Boireau.
55	Traitement des Vins, tome 2	R. Boireau.
56	Culture de la Vigne	R. Boireau.
57	Viticulture et Oenologie, tome 1	C. Ladrey.
58	Viticulture et Oenologie, tome 2	C. Ladrey.
59	L'Art de Faire le Vin	C. Ladrey.
60	Le Phylloxera	C. Ladrey.
61	Traite de Vinification	L. F. Dubief.
62	Trésor des Vignerons	L. F. Dubief.
63	La Fermentation des Vins	Le Gentil.

CATALOGUE OF BOOKS—Continued.

No.	Title of Book.	Author.
64	Génération des Ferments.....	E. Fremy.
65	Culture de la Vigne.....	A. Lenoir.
66	Les Vignobles.....	A. Dubreuil.
67	Le Vigneron Provençal.....	A. Pellicot.
68	Travail des Vins.....	E. J. Maumené.
69	Etudes sur les Fermentations.....	A. Gautier.
70	La Sophistication des Vins.....	A. Gautier.
71	Statistique de la Vigne.....	Morelot.
72	Enologie Française.....	Cavoleau.
73	Entre Vignerons à la Veillée.....	M. Daguillon.
74	Culture du Médoc.....	A. Joubert.
75	Les Vins.....	A. Joubert.
76	La Vigne en Chaintres.....	H. Hemmer.
77	Le Midiou.....	Foex et Viala.
78	Submersion des Vignes.....	T. Ambroy.
79	Plants Américains.....	E. Courty.
80	Maladies de la Vigne.....	Serizne.
81	Manuel de Viticulture.....	G. Foex.
82	Culture du Chasselas.....	R. Charmeux.
83	Guide du Vigneron.....	F. Lacoste.
84	Maladie de la Vigne.....	Bouchardat.
85	L'Art de Greffer.....	Ch. Baltet.
86	De l'Action du Froid.....	Ch. Baltet.
87	Arboriculture, Fruitière, et Viticulture.....	Ch. Baltet.
88	Chauffage des Vin.....	Giret et Vinas.
89	L'Art de Faire le Vin.....	Chaptal.
90	L'Art de Faire le Vin.....	A. B.
91	L'Art de Faire le Vin avec les Raisins Secs.....	J. Audibert.
92	Les Raisins Secs.....	J. Audibert.
93	St. Emillion et ses Vins.....	Cocks et Feret.
94	Manuel des Vins.....	E. Robinet.
95	Analyse des Vins.....	E. Robinet.
96	Le Vin.....	Vergnette-Lamotte.
97	Le Vin.....	
98	Du Vin.....	C. Husson.
99	Méthode de Vinification.....	Aubergier.
100	Les Vins Exotiques.....	R. Sempé.
101	Fraudes et Maladies du Vin.....	J. Brun.
102	Fabrication des Liqueurs.....	Tondeur.
103	Fabricator des Liqueurs, tome I.....	P. Duplais.
104	Fabricator des Liqueurs, tome II.....	P. Duplais.
105	Vin de Bordeaux.....	P. Carles.
106	Viticulture de L'Anjou.....	E. Borit.
107	Les Ravageurs des Vergers et des Vignes.....	La Blanchère.
108	La Vigne et le Vin.....	Burdet.
109	Culture de la Vigne dans la Côte-D'Or.....	E. Cornu.
110	La Lutte contre le Phylloxera.....	J. A. Barral.
111	Le Phylloxera.....	Monillefert.
112	Culture de la Vigne Américaine.....	
113	Les Vignes Américaines.....	
114	Les Vignes Américaines.....	
115	Manuel du Négociant.....	Francois.
116	Culture du Chasselas.....	Roret.
117	Eaux et Boissons Gazeuses.....	Roret.
118	Calendrier des Vins.....	Roret.
119	Culture de la Vigne.....	Roret.
120	Négociant d'Eau de Vie.....	Roret.
121	Distillation des Vins.....	Roret.
122	Amélioration des Liquides.....	Roret.
123	Fabricant de Cidre.....	Roret.
124	Fabricant de Levure.....	Roret.
125	Fabrication des Engrais.....	Roret.
126	Manuel d'Alcométrie.....	Roret.
127	Manuel du Distillateur.....	Roret.
128	Manuel du Sommelier.....	Roret.
129	Manuel du Tonnelier.....	Roret.
130	Manuel du Vinaigrier.....	Roret.
131	Manuel du Vigneron.....	Roret.
132	Monographie des Greffes.....	Roret.

CATALOGUE OF BOOKS—Continued.

No.	Title of Book.	Author.
133	Les Vignes Américaines	Millardet.
134	Culture de la Vigne	Persoz.
135	Le Parfait Maître de Chai	Peyroux.
136	Théorie des Pèse Liqueurs	Benoit.
137	Conseiller du Débitant de Boissons	Du Liège.
138	Quatre Ans de Luttés pour nos Vignes et nos Vins	P. De Lafitte.
139	La Distillation	H. Déon.
140	Manuel de la Distillation	C. Stammer.
141	Manuel des Distilleries	J. Péroche.
142	De l'Alcool	P. Jaillet.
143	Fabrication de l'Alcool	J. Paul Roux.
	{ La Question du Vinage	H. Messine.
	{ Guide du Vigneron	Crolas.
	{ Contre le Phylloxera	Vermorel.
144	{ La Pulvérisation	P. Guyot.
	{ Etudes sur les Boissons Fermentées	M. Bouchérié.
	{ Le Vin dans la Soloque	E. Burdel.
	{ Soins à Donner aux Vins Fins de la Cote-D'Or	Seguin-Roland.
	{ Sur la Viticulture de la Charente-Inférieure	J. Guyot.
	{ Plantation et Culture de la Vigne	A. Desvignes.
	{ Formation des Végétaux	Chavée-Leroy.
	{ Vins Sophistiqués	E. Bastide.
145	{ La Vigne et son Phylloxère	N. Bassett.
	{ Maladie de la Vigne	Delfau.
	{ La Gélée des Vignes	A. Desforges.
	{ Fouloirs, Pompes, Pressoirs	De Martin.
	{ Le Greffeur de Vignes	V. Pulliat.
146	La Vigne	Bertall.
147	Histoire des Insectes Nuisible a la Vigne	Andouin.
148	Etudes sur le Phylloxera Vastatrix	Cornu.
149	{ Observations sur le Phylloxera	
	{ Etudes sur les Péronosporées	Cornu.
	{ Etudes sur la Nouvelle Maladie de la Vigne	
	{ Mémoire sur les Moyens de Combattre l'Invasion du Phylloxera	Dumas.
150	{ Indications Générales sur les Vignobles des Charente	Girard.
	{ Mémoire sur la Reproduction du Phylloxera du Chêne	Balbani.
	{ Rapport Général sur le Phylloxera	Destremx.
151	{ Recherches sur le Phylloxera Vastatrix	Institute de France.
	{ Commission du Phylloxera	Institute de France.
152	Traitement des Vignes Phylloxérées par le Sulfure de Carbon	Marion.
	{ Le Phylloxera et les Cultures Profondes	Ibarrart.
153	{ Rapport sur le Phylloxera	Lefranc.
	{ Rapport sur le Phylloxera	Marion.
	{ Rapport sur le Phylloxera	Dumas.
	{ Rapport sur le Phylloxera	Saint-Supéry.
154	Commission Supérieure du Phylloxera, 1881	
155	Commission Supérieure du Phylloxera, 1885	
156	Phylloxera—Commission Departementale de l'Herault	
	{ Manuel et Calendrier Phylloxériques a l'usage des Vigner- ons de Champagne	Vimont.
157	{ Maladies de la Vigne	Vimont.
	{ Rapport sur le Sulfure de Carbon et les Sulfo, Carbonates, La Submersion	Plumeau.
	{ La Destruction du Phylloxera	Boiteau.
	{ La Coulure du Raisin	Baltet.
158	{ Causes de la Chlorose chez l'Herbemont	Foex.
	{ L'Histoire du Traitement du Mildiou par le sulfate de Cuivre	Millardet.
	{ L'Anthracnose	Sol.
159	Enquete sur le Peronospora	Con- gress Viticole d'Alger.
160	Le Privilège des Vins a Bordeaux	Kehrig.
161	{ Reconstitution des Vignobles par les Cepages Americains	Rougier.
	{ Mission Viticole en Amerique	Viala.
162	Catalogue des Vignes Americaines	Bush et Fils et Meissner.
163	Mélanges	Ch. Joly.
164	Traite de Chimie, tome 1	Pelouze et Fremy.
165	Traite de Chimie, tome 2	Pelouze et Fremy.

CATALOGUE OF BOOKS—Continued.

No.	Title of Book.	Author.
166	Traite des Chimie, tome 3	Pelouze et Fremy.
167	Traite de Chimie, tome 4	Pelouze et Fremy.
168	Traite de Chimie, tome 5	Pelouze et Fremy.
169	Traite de Chimie, tome 6	Pelouze et Fremy.
170	Tableau Général du Commerce de la France, tome 1. 1867-1876	
171	Tableau Général du Commerce de la France, tome 2. 1867-1876	
172	Tableau Général du Commerce de la France. 1876	
173	Tableau Général du Commerce de la France. 1877	
174	Documents Statistiques sur le Commerce de la France. 1881	
175	Documents Statistiques sur le Commerce de la France. 1882	
176	Documents Statistiques sur le Commerce de la France. 1883	
177	Documents Statistiques sur le Commerce de la France. 1884	
178	Documents Statistiques sur le Commerce de la France, tome 1. 1886	
179	Documents Statistiques sur le Commerce de la France, tome 2. 1886	
180	Costruzioni Enotoiche e Vasi Vinari	Cerletti.
190	Indirizzo ai Proprietari ed ai Coltivatori	Società dei Viticoltori Italiani.
191	Commissão Central dos Servicos Phylloxericos	Villar D'Allen.
192	La Fillossera in Italia nel 1882	
193	Die Concentration des Mostes im Vacuum	Springmuhl.

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No.	Title of Book.	Author.
194	Hand-Book of British Fungi, vol. 1	Cooke.
195	Hand-Book of British Fungi, vol. 2	Cooke.
196	Grevillea, vols. 1-2	Cooke.
197	Grevillea, vols. 3-4	Cooke.
198	Grevillea, vols. 5-6	Cooke.
199	Grevillea, vols. 7-8	Cooke.
200	Grevillea, vols. 9-10	Cooke.
201	Grevillea, vols. 11-12	Cooke.
202	Michelia, vol. 1	Saccardo.
203	Michelia, vol. 2	Saccardo.
204	Syllogi Fungorum. vol. 1	Saccardo.
205	Syllogi Fungorum. vol. 2	Saccardo.
206	Geneva Pyrenomycetum	Saccardo.
207	Fungi Italici, fasc 1-4	Saccardo.
208	Fungi Italici, fasc 5-8	Saccardo.
209	Fungi Italici, fasc 9-12	Saccardo.
210	Fungi Italici, fasc 13-16	Saccardo.
211	Fungi Italici, fasc 17-28	Saccardo.
212	Fungi Italici, fasc 29-32	Saccardo.
213	Fungi Italici, fasc 33-36	Saccardo.
214	Index Alphabeticus Fungi Italici.	Saccardo.
215	Conspectus Generum Discomycetum	Saccardo.

ENGLISH.

No.	Title of Book.	Author.
216	Cross and Self-Fertilization in the Vegetable Kingdom	Darwin.
217	Wine, the Vine and the Cellar	Shaw.
218	Redding on Wines	Redding.
219	A Winter in Madeira and a Summer in Spain	Dix.
220	Wines and other Fermented Liquors	Sheen.
221	The Wine Press and the Cellar	Rixford.
222	The Grapevine	Meredith.
223	The Grape Culturist	Fuller.
224	Grape Culture, Wines and Wine Making	Haraszthy.
225	Fermentation	Schutzenberger.
226	Woodward's Graperies	Woodward.
227	Facts about Champagne	Vizetelly.
228	Facts about Sherry	Vizetelly.
229	Facts about Port and Madeira	Vizetelly.
230	A History of Champagne	Vizetelly.
231	Wines of the World	Vizetelly.
232	American Grape Growing and Wine Making	Husmann.
233	Origin, Nature, and Use of Wine	Thudichum & Dupré.
234	Report on Cheap Wine	Druitt.
235	Manufacture of Liquor	Lacour.
236	Distillation and Rectification of Alcohol	Brannt.
237	Practical Distiller	Byrn.
238	Practical Brewer	Byrn.
239	Cooling Cups and Dainty Drinks	Terrington.
240	The Ramrod Broken	
241	History of Ancient and Modern Wines	Henderson.
242	Viniculture of Claret	Maior.
243	Gauger's Manual	
244	Manual of Qualitative Chemical Analysis	Presenius.
245	Chemistry of Common Life, vol. 1	Johnston.
246	Chemistry of Common Life, vol. 2	Johnston.
247	Farm Drainage	Elliott.
248	Catalogue of European Vines	Bleasdale.
249	Catalogue of American Grapevines	Bush & Son, and Meissner.
250	Barry on Wines	Barry.
251	Works of Pliny (1526)	
252	{ Wine and its Counterfeits.	Denman.
252	{ Wine Culture in California	Gibbons.
253	The Bordeaux Wine and Liquor Dealers' Guide	
254	{ A Memoir on Olive Growing	Pohndorff.
254	{ A Practical Treatise on Olive Culture	Flamant.
254	{ The Western Catalpa	Warder.
255	{ Woody Plants of Ohio	Warder.
256	Statements and Arguments Against the Proposed Franco-American Treaty	
257	Guide to the Study of Insects	Packard.
258	Injurious Insects of the Orchard, Vineyard, etc.	Cooke.
259	Insects Injurious and Beneficial	Cooke.
260	Insects Injurious to Fruit and Fruit Trees of California	Cooke.
261	Insects Injurious to Vegetation	Harris-Flint.
262	Insects Injurious to Fruits	Saunders.
263	Report on Cotton Insects, 1879	Comstock.
264	Rocky Mountain Locust	Riley-Packard-Thomas.
265	Insects of Missouri	Riley.
266	Insects Injurious to Forest and Shade Trees	Packard.
267	Fungus Diseases of the Grapevine	Scribner.
268	Ure's Dictionary, vol. 1	
269	Ure's Dictionary, vol. 2	
270	Ure's Dictionary, vol. 3	
271	Ure's Dictionary, vol. 4	
272	United States Dispensatory	Wood, Remington, and Sadtler.
273	German and English Dictionary	Adler.
274	French and English Dictionary	Clifton and Grimaux.
275	English and French Dictionary	Clifton and Grimaux.
276	Unabridged Dictionary	Webster.
277	Atlas of the World	Rand, McNally & Co.
279	Encyclopædia Britannica, vol. 1	
280	Encyclopædia Britannica, vol. 2	

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283	Encyclopædia Britannica, vol. 5
284	Encyclopædia Britannica, vol. 6
285	Encyclopædia Britannica, vol. 7
286	Encyclopædia Britannica, vol. 8
287	Encyclopædia Britannica, vol. 9
288	Encyclopædia Britannica, vol. 10
289	Encyclopædia Britannica, vol. 11
290	Encyclopædia Britannica, vol. 12
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295	Encyclopædia Britannica, vol. 17
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297	Encyclopædia Britannica, vol. 19
298	Encyclopædia Britannica, vol. 20
299	Encyclopædia Britannica, vol. 21
300	Encyclopædia Britannica, vol. 22
301	Supplement, Encyclopædia Britannica, vol. 1
302	Supplement, Encyclopædia Britannica, vol. 2
303	Supplement, Encyclopædia Britannica, vol. 3

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CLARENCE J. WETMORE, Secretary.



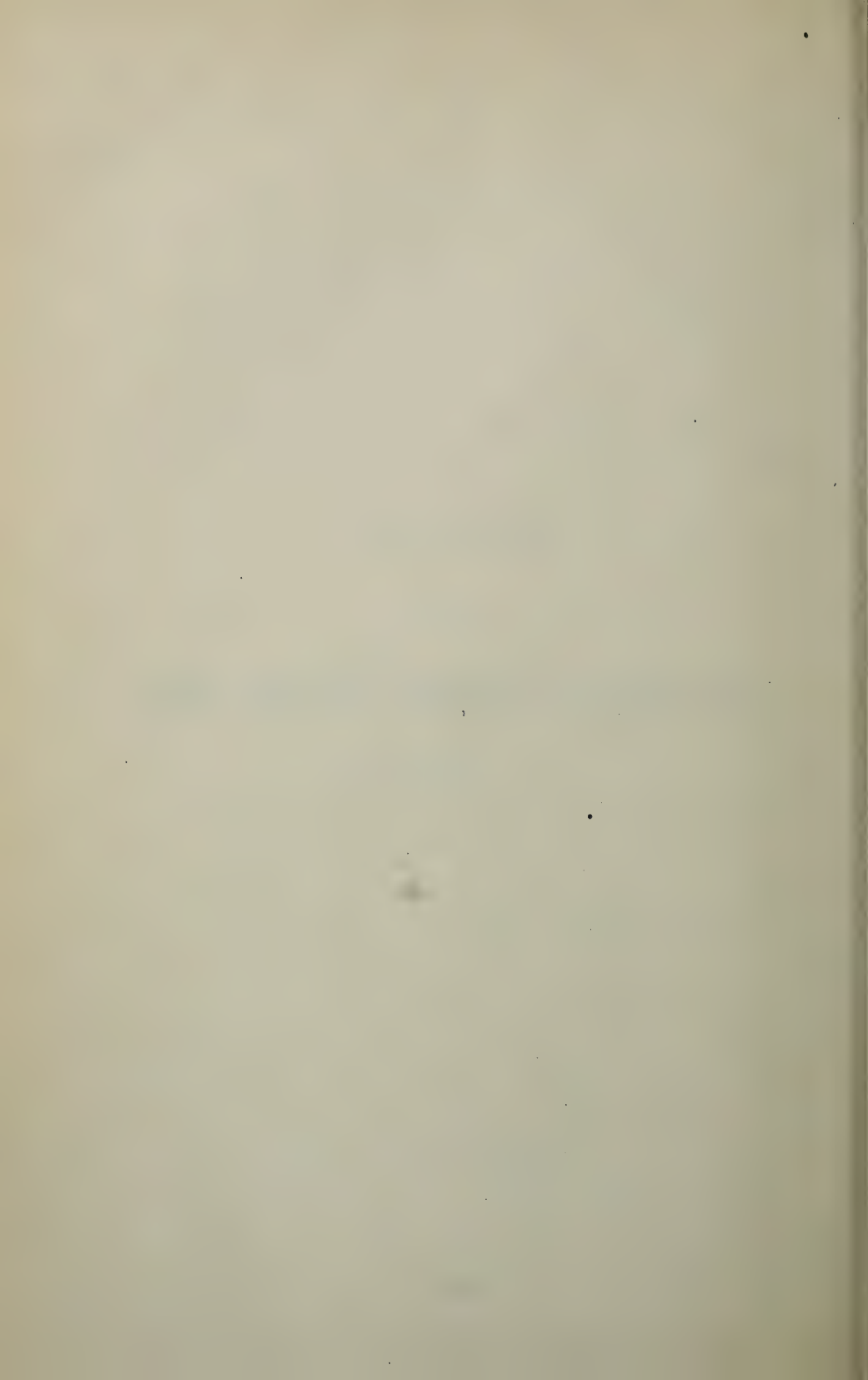
REPORT

OF THE

Chief Executive Viticultural and Health Officer,

J. H. WHEELER,

For the Year 1887.



REPORT OF J. H. WHEELER,

Chief Executive Viticultural and Health Officer, for 1887.

To the Board of State Viticultural Commissioners :

GENTLEMEN: I am unable to report to you for the whole twelve months of 1887, having been appointed to this office in March; since which time a fair share of my efforts have been devoted to an endeavor to properly qualify myself for the work.

It has been my pleasant duty to visit and examine many sections of the State where the industry of viticulture has gained prominence. I have found the interest in wine producing most concentrated in the bay counties.

The interest has fallen off, in a great measure, in Los Angeles and surrounding counties, where raisin growing has relatively enlarged in importance.

Fresno County has become an important raisin-producing center, and a marked interest in the subject has been communicated to neighboring counties.

The production of raisins in Yolo County continues important; her residents conceding no superiority to counties south.

Yuba, Tehama, and Shasta are proved raisin counties. While Solano, Sacramento, Placer, and other foothill counties are producing the bulk of shipping grapes designed for eastern markets.

The local markets are largely supplied by Solano, Sonoma, and Santa Cruz Counties; the latter being preëminently suited to the production of table grapes for the late markets.

The larger part of our wines at present come from Napa, Sonoma, Santa Clara, Alameda, Los Angeles, and Fresno Counties. Santa Cruz is making rapid strides in this direction, and some interest is being manifested in the planting of wine grapes in Ventura, San Luis Obispo, and Monterey Counties.

The greatly increased values of land in Los Angeles, San Diego, and San Bernardino Counties, together with the building of new railroads and their attendant stations and town sites, have so turned the attention of the people from viticulture, that few additions have been made to the plantations of the previous year.

In my studies and investigations I have to acknowledge the assistance of vine growers in every part visited. On all sides there has been evidenced a desire to aid your officer by all available means; to do all possible to forward our general interest, at the same time eliciting instruction.

I have many to thank for aid, and some excuses to make to those whose invitations to visit their vineyards I have been unable to accept, because of official work elsewhere.

THE SEASON'S CALENDAR.

The grape-growing season of 1887 has—unlike many preceding seasons—been characterized by the absence of any pronounced natural plague or scourge. As stated by some, “the grasshoppers, worms, and bugs have let our crops alone, only to be shriveled by north winds, consumed by

drought, or fall the prey to high-priced labor and low values." We have had the usual visit from the grapevine flea beetle, in May, which was buried in foliage made by the vines in June. Contemporaneous with this visitor came the false chinch bug, which did not, altogether, molest one acre in the State, although appearing in small spots in several sections. The vine hopper, or, as sometimes called, the thrip, became formidable in some sections, while almost disappearing in others.

THE VINE HOPPER.

More alarm has been manifested over the appearance of this pest than in any previous season, and certain varieties, viz.: the *Trousseau*, *Chauche Noir*, and *Rieslings* have been their special prey. This insect is exterminated with difficulty, because it derives its nourishment from the sap only, which we are unable to inoculate with any poison. Insects consuming directly the tissue of the leaf may be destroyed by spraying the foliage with an arsenic solution; but for the vine hopper, such resorts are of no avail. The hopper must be killed by mechanical means.

Sheep turned into the vineyard in fall has proved a valuable auxiliary to other remedies, but this is a resort seldom available. Carrying a torch through the vineyard at night—to which they are driven by disturbing the vine—has proved unsatisfactory; likewise some toxical solutions suitable for destroying other insects, but availing little with this.

THE USE OF PARIS GREEN.

Most of the enemies of the vine feed directly upon the foliage—the grasshopper, rabbits, squirrels, army worms, or sphynx-moth worm, beetles, scribe, false chinch bug, cutworms, etc. Special remedies have been devised for many of these; prominent among which is the arsenic and bran remedy for destroying the first three enumerated—an effective antidote, which can hardly be improved upon. The desirableness, however, of having a single remedy to meet all these parasites is apparent to every vineyardist.

The old—yes, the oldest remedy—Paris green or London purple, known to be destructive generally, has been brought into requisition. Extensive experiments have this year been conducted by me at Mr. Crabb's vineyard, Oakville, Napa County, to prove that a solution of Paris green or London purple—one pound to one hundred and sixty gallons of water—may be used to spray the foliage of the vine, while the grapes are small, with perfect safety to the consumer of grapes, wine, or raisins produced therefrom. The efficacy of the remedy as a destroyer, is not questioned; but, to determine whether—in California, where summer rains do not fall, a condition dissimilar to that found in sections where the remedy is known—I say whether, here, it could be used with the same guarantee of safety or not, seemed to me a question important enough to merit a trial. It is my pleasure to announce a perfect success; the products, grapes, and wine were carefully examined by Professor Rising, State Analyst, and proved innocuous.

I have prepared a full report of the experiment, which will be found in the Report of the Viticultural Convention for 1888, together with the other proceedings of the Convention.

FROST.

I have, from time to time, communicated to the public, through the press, the results of my study and observation on this subject; having made much original research, and, aided by many colaborers, I am able to report great progress.

The first and greatest calamity which visited our vineyards this season, was the frost, which will be remembered as the most damaging one which has yet appeared in California. It is safe to say that by direct effect, viz., destroying both fruit and foliage, and indirect, that by producing *coulure*, and impairing those grapes which were blooming at the time, the crop of the State for 1887 was reduced one third. The greatest harm was done in Napa, Sonoma, and the foothill counties. Incident to the loss and damage there occurred much study and investigation of effects, and methods of avoidance. The subject became one common and pertinent inquiry, the results of which, added to former researches, may be summed up as follows:

Under ordinary circumstances vineyards are damaged by frost only when the thermometer (F.) so set as to mark the true temperature of the vineyard, marks $+27^{\circ}$ or lower.

When there is no wind, and frost appears, vineyards of the lower ground ordinarily are harmed first and most. I say ordinarily, for I have found this rule sometimes modified by the nature of the soil. Silt and sandy soils are more productive of frost than clay or gravel. I have frequently seen this verified, a part of the same acre of vines, which part was of gravel and four feet lower than the remainder, escaped unhurt, while that on the higher sandy soil was badly frosted.

This may be explained in a measure by the fact that the growth made on the gravel was slow and toughened by lack of moisture, while that of the upper rich soil was full of water, rank and luxuriant. For this evil, nature affords a partial remedy in causing the vines on the richer soil to put forth later than those of the gravel.

Having disposed of the most common exception we will proceed with our rules.

When the air is moving appreciably and frost appears, the uplands are almost as subject to damage as the bottom lands. Occasions have appeared where the damage to uplands has been intensified by the greater advancement of the growth.

Recent experiences demonstrate that the vineyards of Central and Northern California may be damaged by frost as late as the middle of May.

Smoking, to keep off frost, has proved inefficient, except where the frost is extremely light—even then it has proved an unsatisfactory remedy, owing to the difficulty in getting the help out at a proper time. In 90 per cent of the cases where this remedy has been relied upon solely, it has failed when the temperature has reached the damaging point.

I have known vineyardists who smoked their vineyards, and who credited the process with success, when the thermometer marked only 32° , or a little lower. The same immunity would have been had if no smoke had been created.

I am unwilling to advocate smoking except as an auxiliary, and then to be employed late in the spring. Damp manure smothered with weeds makes the best smudge, and is far ahead of tar or other materials. To light the piles rapidly, a small amount of kerosene should be poured on,

*This is the temperature shown by the thermometer placed in the open vineyard and not on the side of a house, tree, or large object of any kind, which is never a true guide, as it retains and continues to give off heat.

and the same ignited with a torch or match. If the manure is placed in old sacks or mats it will be found convenient to move when cultivating, will keep drier through rainy weather so common at the season of frosts, and may even be removed at the end of the season if desired for another year.

The theory that vines which have been frosted may be saved by protecting from the direct rays of the sun when it appears, is exploded. Shading the frosted foliage will not save the vine from damage, nor even ameliorate it.

The remedy employed by Guyot, namely, that of covering the vines by mats, though an effectual cure for the evil, is one quite unavailable to California vineyardists with the present cost of labor and material, and the existing values for grapes and wine.

The most perfect cure yet known for damage from frost is the avoidance of the danger, by selecting a warm, protected, and elevated location on which to plant. Here the vine properly belongs in all cases, and is generally safe. There is, however, for those who have been unfortunate enough to choose a frosty locality, some consolation in the method of avoiding damage by proper pruning.

PRUNING FOR FROST.

To do this, so prune the vine that the desired buds shall remain dormant till this danger is past. One method of producing this result is that of leaving the vine unpruned, absolutely, until eight or ten days before the dangerous period is over; the dormant buds requiring about ten days to put forth a susceptible growth.

With this system, the terminal buds, and those on the laterals, come out early; and those left near the base remain perfectly dormant and safe till forced out later by pruning again.

Where practicable, this proves an efficient remedy. There are, however, but few cases which permit of this resort, as the growth of the previous year becomes so tangled as to require removal to permit of the ordinary operations of the vineyard in spring. Young vines of upright growth, and those grown on poor soil, will permit of the remedy, or it may even be carried on by first tying up the canes to permit of cultivating.

This method causes the fruit to ripen somewhat later, but this is little or no objection in California. A harm may, however, be accomplished by thus suddenly stopping the flow of sap entirely. I have seen vines pruned in this manner for three consecutive seasons without any apparent permanent injury to the plant, though the injury may become manifest later on.

Another method having many advantages over the foregoing, and open to few objections, is that of pruning one half the spurs (which would customarily be left), as usual, viz., short, leaving the balance of full length. If laterals are found on these long canes, all the better, as the presence of the lateral insures the dormancy of the bud at its junction with the main canes. In this case, with the approach of warm weather, the short spurs put forth, likewise the terminal buds on the long canes and laterals. If the frost comes, it destroys all this; following which the short spurs put out a growth from the secondary buds, providing little fruit, but furnishing good canes for next year's spurs. The long canes may now be divested of laterals, and pruned short immediately following the frost, and they will then, after about ten days, commence to produce the same growth and fruit which would have been obtained without frost, or which would have been obtained with the adoption of the ordinary method of short pruning.

Again, if no frost appears, the long canes may be pruned back at the time when danger is past without any serious setback, as by this time the short spurs are out and showing fruit. The work, too, is made comparatively simple by the vines having been previously pruned up into shape. The method entails some irregularity in the ripening of the fruit, but this has proved no serious difficulty. But little more labor is required, and the most absolute safety secured. I have seen this method practiced on a large scale with eminently satisfactory results.

The knowledge of one fact will enable the grower to adopt methods peculiarly suited to his locality or variety to be pruned.

If the laterals of any cane of fair size be allowed to remain at the time of pruning, it insures the dormancy of the bud at its junction with the stem. This is true in all cases, except when but too few canes are left in proportion to the strength of the vine; or, when the vine is very small and young, in which latter case more canes should have been allowed to remain.

With this fact in view, the pruner of long wood varieties in frosty localities should leave enough laterals on the spurs remaining to insure him against loss. Be it known, also, that the laterals, where such are left, may be relied upon for heavy fruiting wherever a case of necessity arises. They will set as early and as well as, if not better, than the original canes from which they spring. Short-pruned varieties which put forth very early in sections liable to frost—such, for instance, as the Folle Blanche—may be advantageously pruned, as before indicated, leaving the laterals on the remaining long canes to insure the buds at the base of these canes continuing dormant. After nearing the frost period, these should be pruned off and a spur of the desired length, with only dormant buds, will be the result. This process I have witnessed—the results being satisfactory.

Thus it may be seen that, by intelligent pruning, the common damage by frost may be averted, though entailing some additional expense and perhaps some loss to the plant—a loss, much less, however, than that often observed where no remedy is adopted.

High pruning is a remedy much like smoking. Where frosts are light, vines trained high will escape the still frost, when if pruned low they will be scorched. A heavy frost will injure both high and low pruned vines, and the short pruned fares worse, even here.

The freeze, accompanied by a wind or gently moving air, has been known to injure the tops of high vines leaving the bottoms untouched. This phenomenon occurs most frequently late in spring, when the foliage is well advanced, thereby protecting the lower parts.

FUNGOID DISEASES—OIDIUM.

The *oidium*, or powdery mildew, commonly called mildew in California, is the most common enemy of its class. The past season has been one of little complaint from this source, probably owing to the liberal use of sulphur, practiced now annually by our vineyardists. For a full description of this *oidium*, with remedies and treatment, see Appendix I, devoted to that subject, and accompanying this report.

PERONOSPORA VITICOLA

Is known more commonly as downy mildew. This disease, together with anthracnose and black rot, are common throughout the States east of the Rocky Mountains. They form a present scourge to Europe, but are not known to California vineyardists. Dr. Harkness states that he has found

peronospora upon the *V. californica*, but there only. My searches for this disease, and they have been prosecuted with considerable vigilance, have never revealed its presence in the State. It has frequently been reported to me by vineyardists, but on inspection I have found some other trouble only. When Professor Viola, of the Agricultural School of Montpellier, was visiting California in September, in company with F. L. Scribner, of our Department of Agriculture, it was my pleasure to visit several vineyards with them; but we were unable to find any evidence of *peronospora*. I exhibited to them various specimens of leaf diseases which had been sent to me for *peronospora*; but they pronounced them "diseased epidermus." The "Spanish or black measles," so called in the northern valleys, they did not recognize as anything they had seen before; but did not regard it as very formidable.

The conditions favorable to the development of *peronospora* are known to grow only out of an extremely humid atmosphere. Actual moisture must be deposited and continue on the leaves—such as results from summer rains. I believe, therefore, that California vineyardists have, in our dry and comparatively rainless summers, an assurance that this disease—one which ranks second only to the phylloxera in France—will never become common. It would be idle to presume that it had not been introduced with some of the direct importations of stocks from diseased districts. We should have suffered from its general attack long before this if our climate did not preclude it.

POURIDIE

Is a fungus found to infest many California vineyards, particularly those planted on wet and improper soils. It has been observed only during the last few years, though probably existing previously, unrecognized. The disease is well known in Europe, existing there as here, only in spots unfit for vineyard purposes. When found, it has been sometimes termed "root rot," a very proper name, in that it affects the roots, with the following symptoms: The vine shows general signs of enfeeblement, growing sometimes for a short period with increased vigor, but soon relapsing into a meager production of foliage and subsequent rotting of the roots, both large and small. These latter exhibit a brown color, and appear saturated with water, so much so as to show water plainly when cut. The trunk of the vine continues healthy, though the foliage appears like that of a vine infested with phylloxera. Vines affected may continue to live for six, ten, or even fifteen months, varying as the conditions are more or less favorable to the development of the disease. A large area may become infested in a short time if the whole is similarly situated. The disease thrives in excessively humid soils. Particularly is this the case where there exists an impervious subsoil, which forms in a subterranean basin wherein there remains stagnant water. Germs of the disease may be introduced on the vines themselves, or may come from vegetables or trees.

At first the new fibers of the affected plant show no signs of the attack; but soon swellings will be seen on the old roots which break through the bark and protrude a pithy growth, which soon becomes dead and rotten. After some time the whole substance of the root decays to such an extent that the vine, at this stage, may be easily uprooted by hand. To cure the evil, one can only hope to so modify the conditions of the soil as to prevent the further spread of the disease, and then destroy the vines on which it exists. They should be immediately pulled up and burned on the spot, to avoid any diffusion of the spores to other places. Following this, the ground should be thoroughly worked over and drained. Leave the spot

unplanted for several years, after which the place may be again planted to vines.

I have had several samples of this disease sent me from the counties of Sonoma and Napa, besides receiving reports of its presence from several other counties. The malady cannot flourish on well drained soils—soils to which alone the vine belongs; but the vineyards of the wet lowlands or undrained uplands should be carefully guarded against its introduction and spread.

Before leaving the subject of diseases of the vine, I should remark concerning the trouble which has occurred in many of the vineyards about Orange, Anaheim, and elsewhere in Los Angeles County, that the attention of our leading scientists and students has been repeatedly called to the unknown disease, and they have as yet failed to identify it as due to any particular fungus or parasite; and our former impressions continue concerning it, viz.: that it is purely the result of climatic influence.

Sudden or unfavorable changes in temperature produce like results in the northern counties; but are not of such general occurrence. I have known many vines killed thus during the past year.

A warm spell in winter preceding a cold one, though the latter be not a regular freeze, may kill the vine or so nearly destroy it that it dies the succeeding summer. I have received recently samples of vines so injured. Examination of the buds, which had failed to put forth, shows a brown and dead center—proof of the presence of moving sap in cold weather. The collar of the vine—that part of the stump which joins the trunk to the roots—was found dead and brown. Inasmuch as this is the tenderest part of the plant exposed, it suffered with the buds, from a winter start of the sap succeeded by cold weather. Vines so affected and others near, but not exhibiting the same signs of the attack, lingered through part of the summer and died in a manner similar to those noticed in Los Angeles County.

Those counties favored with occasional warm and springlike weather in midwinter, are, I believe, most liable to complaints of this nature.

PHYLLOXERA.

The spread of this insect has been far more rapid during the past season—favored by drought as it has been—than ever before. Abundant new spots have become manifest, and several new districts have been added to the quarantine list. I have found new instances of their spread by the use of cuttings taken from diseased vineyards; though convinced that their principal means of distribution has been by rooted vines.

I have found the winged insects common throughout the months of June, July, August, and September, giving them a long season in which to increase the infected territory.

Few of our vineyardists appreciate the fact that the progression governing the increase of this pest is one of geometrical ratio—not an additive one; and though it may be several years before the presence of a few insects become evident in the vineyard, from that time on the spread is alarming, and, without stern resistance be offered, the giving way of a few acres, or even a few hundred vines, means the loss of all within a limited number of years.

The reports of the Commission issued heretofore concerning this pest, and the best remedies for its extermination which we have urged for adoption, are more than ever confirmed at the time of this writing. As proof of this I am able to give the following, which I translate from the report

of "*La Commission Supérieure du Phylloxera*," of France, for 1887, representing as it does the results of unlimited experiments and long years of practical work:

The struggle against the phylloxera goes on by submersion, insecticides, and by replanting with American vines in the following proportion:

	1887.	1885.
Submersion, number of acres treated	66,662	50,847
Sulphide of carbon, number of acres treated	165,512	101,462
Sulpho-carbonate, number of acres treated	22,050	13,067
American vines, number of acres treated	416,292	188,205

It may thus be seen that great preference is shown for resistant vines, the acreage rising in two years from one hundred and eighty-eight thousand two hundred and five acres, to the enormous figures of four hundred and sixteen thousand two hundred and ninety-two acres. This answers the question so often put to me by vine growers: "Are resistant vines a success?" We have published advice on this subject continually, but there do not exist to-day in the whole State, two thousand acres of resistant vines. Those resistants which have been properly selected, planted, and cared for, are to-day monuments of success, but they are too few to save us from the growing ravages of this pest.

It will be noted in the above, that the use of carbon bisulphide has largely increased in France; that the use of sulpho-carbonates, because of the great expense attached, has grown less popular. The number of vineyards submerged is nearly constant, because of the special natural requirements of this process. For fuller particulars concerning the success of different remedies employed in Europe, and the resistant vines most popular at the present day, the reader is referred to Appendix V of his report, which treats of the results obtained in the vineyards of southern France by the use of various methods and varieties.

California vineyardists can point with pride and assurance to the planting of grafted resistant vines, belonging to Mr. Julius Dressel of Sonoma, where, in the midst of ravaging phylloxera, and on soil of very moderate worth, a magnificent yield of choice varieties has already been secured by this means. Others have been similarly successful in growing and grafting resistant vines; but I have, as yet, found no other test so severe in its nature as that conducted at Mr. Dressel's vineyard. Mr. Dressel states that he is perfectly satisfied with the *Riparia* as a grafting stock—easy to root and sufficiently vigorous in his soil to supply any vigorous growing variety. The *Lenoir* has been growing rapidly in favor in California, because of its rapid development and easy grafting. It proves difficult to root, but is preferred over the *Riparia* and some others, because it furnishes a wine suitable for blending as a direct producer. But grafting is both expensive and slow, and, in fact, the value of carrying on any warfare may be somewhat altered by the present depressed condition of the wine-making industry and the popularity and improved value of other branches of agriculture in California.

During this season, when grapes for wine making have in some instances sold for as low as \$7 per ton, and the average in many districts has been only \$12, the question has frequently arisen: Would it not be better when the phylloxera appears to replant and reconstitute the vineyard with prune trees, almonds, olives, or other fruits unsusceptible to the phylloxera? There are cases, where, unless there exists some special reason for keeping up the vineyard, viz., particular appropriateness of soil and unsuitability for other use, it may be best to adopt this alternative, continuing the produc-

tion of the vineyard as long as it proves profitable, or at least until the trees should come well into bearing.

Where excellent wines have been produced and a market therefor has been established—particularly if the brand has become well known by advertising at great expense; or even where expensive facilities for making and holding wines have been provided—here are found exceptions demanding the continuance of the vineyards and warring off the phylloxera, even though the expense be considerable.

HERBACEOUS GRAFTING.

I have to say, concerning this method of changing varieties—particularly described in the paper published with this report—that although generally tried, the method has proved a signal failure. One disciple of this Commission, residing in Australia, reports a success of five out of eight. If such results were possible in California, I should be greatly encouraged to make another effort, earlier in the season, but as it is we are able only to record the experiment as valuable in its negative results; providing, as it will, *against* the general or extensive use of it at any future time. My attention has been called to several other methods of grafting, which will be thoroughly tried by me during the coming spring. One particularly, that of side grafting, is, I believe, of great promise. It consists in inserting the scion into an incision in the side of the root or collar of the vine, with a partial suppression of the top to force its growth. Thus the growth of the scion may be assured before the old vine is cut off, and if failing, no fruit or time is lost, as the process may be similarly repeated the next year. The many other advantages of this method will be apparent to vine growers; nor is the method purely experimental in California, for it has already been tried in a very few instances, and these with some success.

* OIDIUM (TUCKERI) AND THE USE OF SULPHUR.

BEING

Appendix 1 to the Annual Report of the Chief Executive Viticultural Officer
FOR THE YEAR 1887.

The *oidium* (*tuckeri*) is a vegetable parasite of American origin. It attacks all growing portions of the vine, and imparts to the leaves a chapped appearance, and gives them a whitish or gray color. The vine, when badly affected, has a blighted and sickly appearance; the young leaves and tender parts become dried and roll up, attacked, the herbaceous parts blacken, cease to grow, and end by withering and drying up. This latter extreme is rarely attained in California. The growing berries are attacked as readily as other parts, giving the whole a languishing and unhealthy aspect. The young branches also present blotches of a powdered nature, which ultimately cover the greater part of the surface exposed to the sun, and where badly affected, also taking on a whitish, powdered, and, eventually chapped appearance, which causes them to crack open and cease to grow. Thus it will be seen that the *oidium*, unlike other fungus, affects the crop directly, as well as indirectly, through damage to the foliage. The parasite first appears abundant in June, though frequently commencing its attack in May, at or after the time of flowering.

The conditions favoring the *oidium* are moisture and warmth, the latter playing the most important part. The moisture here meant is not the extremely humid condition of the atmosphere which appears with or immediately follows a rain or heavy fog. A condition often incorrectly named as favorable to *oidium*, but merely the moisture to be found in a sea breeze after it has traveled ten, twenty, or even thirty miles inland. An atmosphere which produces a light dew at night is sufficiently moist to favor to the utmost the propagation of *oidium*. Quite different in this respect is the *Peronospora* and *Anthraco*, which require the deposition of heavy rain, fog, or excessive moisture to produce their growth. For this reason, I believe, California has been comparatively free from the true *mildiou*, a disease which, of late years in France, where summer rains are frequent, has threatened the vineyards to as great an extent as has the dreaded *phylloxera*.

Our principal vegetable parasite thus far has been the *oidium*, one especially favored by our dry, warm climate, and one easily destroyed by the timely application of sulphur.

As before remarked, excessive moisture is unfavorable to the propagation of *oidium*, and a good shower will do much to remove and destroy the germs.

*Frequently and improperly confused with *mildiou*, which it is not. The true *mildiou* is the dreaded *Peronospora viticola*, a parasite far more formidable than the disease we commonly treat with sulphur, and one which does not succumb to this or other simple remedies. It might be, and is sometimes, properly termed "powdery mildew," distinguished thus from downy mildew, which is *Peronospora viticola*.

The misnomer of the parasite common to California frequently leads to a confusion of remedies—sulphate of copper and slacked lime is the remedy for *mildiou*—but one not necessary for our *oidium*.

As to temperature, the disease begins its development where the average of day and night runs up to 53° F.; it spreads rapidly at 70°, and is checked in its growth where the thermometer indicates near 100°. Above 100° its damage is rapidly diminished, and at 112°—a temperature quite common throughout the interior vineyard districts of California—the germs lose their vitality and the effects of the disease entirely cease.

To be sure, where vines make a dense growth, and are trained high above the ground, the germs may be so sheltered in shady spots as to escape the effects of the heat. Where, on the contrary, the vines are trained along or close to the ground and receive the reverberated in addition to the direct heat of the sun—the manner in which vines should be trained—then, the high temperature above named accomplishes a complete extermination of the parasite, a result which has often been noted in Algiers, where such temperatures are frequent throughout the early growing period of the vine.

Let it be borne in mind generally that the propagation of the *oidium* and other vegetable parasites of the vine are greatly favored by trellises and high training. Short pruned vines and those trained close to the ground are most exempt from fungoid diseases.

A hot north wind will sweep the *oidium* from a vineyard well exposed to its effects. This forms one of nature's most common remedies in California, and should be a consolation to those who may otherwise lose by it in the grain field.

Some varieties of vines are found more susceptible to the attack of *oidium* than others; other conditions being similar.

This fact should influence the vineyardist as to the frequency of applying the remedy and the amount of sulphur employed.

Varieties particularly subject to the effects of *oidium* are: the Folle Blanche, Crabb's Black Burgundy, Muscat, Chasselas, Zinfandel, Teinturier Gamay, Cabernet Sauvignon, Cabernet Franc, Riesling, Carignane, Terret, and Cinsaut. Among those little susceptible are the Grenache, all of the true Pinots, the Alicante Bouschet, Petit Bouschet, Colombar, Sauvignon Blanc, and the Aramon. The American grapes *Vitis labrusca*, *V. riparia*, and *V. rupestris* are but little affected by *oidium*.

Remedies.—Many substances have been applied, principally in the form of powders. Lime has been extensively employed, and it has been found that any dust effects beneficial results on the diseased plant. None have proved so efficacious, however, as sulphur dust, and on this we can rest our perfect reliance, for, if properly applied, it effects all that may be desired in the way of a cure, and is comparatively inexpensive. The *oidium* is a disease quite easy to treat, because its spores and growth are confined to the exterior and exposed portion of the plant, which is not the case with the *Peronospora viticola* and some other vegetable parasites.

The Application of Sulphur as a Remedy.—There have been many conflicting and erroneous statements made concerning this remedy, its application and effects, as applied in California. Imperfect and hasty generalizations, drawn from limited local experiences, have not unfrequently been published, and results both expensive and wasteful have often followed. To correct the wrong impressions thus formed and save further dispute, it seems necessary to treat the subject in a somewhat technical manner, the truth on some points of which it seems to me precludes the possibility of further dispute as to kinds which should be employed; the difference in the effect of various brands, imported or domestic, and the manner and time best for making the treatment.

The vineyards of California consume annually twelve hundred tons of sulphur, an average of about fifteen pounds of sulphur per acre. None of

this sulphur is the product of California mines or deposits, as many suppose. For three years previous to 1887 sulphur sublimers and grinders have been entirely dependent on countries other than the United States for their raw material. There has of late years been no sulphur found in California which would pay the cost of mining, refining, and transportation to San Francisco, and be sold here at even double the present cost of sulphur imported from Sicily or Japan.

Four years ago California received small quantities of sulphur from Nevada, but the competition of cheap labor in the Orient, and cheap transportation by sea, soon choked out the local industry. Considerable promise comes to the home industry now from Utah, where large deposits are being worked, and the refined product, ground and sublimed, are being placed on the California market at the same figures as the imported vineyard sulphur, or that prepared in San Francisco from the imported raw material. How long the sulphur mines of Utah will continue available to consumers in the United States will depend entirely upon railroad freights, which have of late been so capricious as to preclude any certain future dependence.

To show the comparative insignificance of our own sulphur mines, let it be known that in 1880 there were mined in the whole United States six hundred tons, while our imports for 1881 aggregated one hundred and five thousand four hundred and thirty-eight tons.

This latter quantity came almost exclusively from Sicily. Virtually the island of Sicily furnishes the world with sulphur, notwithstanding Japan is now her most formidable competitor for the Pacific Coast of North America. Sicily has for years been the original point of production for sulphur used in vineyards the world over; and whether this sulphur—sold mostly in commerce as “Sicily seconds,” and containing not to exceed 3 per cent of ash impurities—has gone first to Marseilles or Antwerp to be ground or sublimed, or whether it has come to New York or California to be ground or sublimed, it has made but one essential difference to California vineyardists, viz.: all sulphur sublimed without the United States pays a duty on entering our ports of one cent per pound, which sometimes makes an addition of nearly fifty per cent to the selling cost. All other brimstone, crude or ground, except in rolls, pays no duty.

I desire to draw particular attention to this difference for the instruction of those who have with this, as with California wines in past years, been led to believe that any goods bearing a French label are better than those produced at home. The case is a parallel to that by which our wine drinkers were long duped by French labels.

Some may claim that the sulphur ground or sublimed in Europe is finer than that prepared in California. To determine this I have examined carefully over twenty samples of sulphur which I have been collecting and carefully saving for several years past, with the following results: Domestic preparations of sublimed sulphur have averaged as fine as those from Marseilles or Belgium. Of the ground sulphur, that produced in California has generally proved the finer; and the finest of all prepared by either method was ground sulphur prepared in California.

So much to the credit of the home industry. I have learned direct from the leading importer of foreign prepared sulphur that generally the Europeans do not grind as fine as is the practice in California; but that if California markets so demand, it may be prepared as fine as needed. This is because they expect us to use sublimed sulphur if sulphur in a fine condition be needed. They care little about the import duty of one cent per pound on the latter, so long as they are reimbursed. Nor is it their busi-

ness or care whether we use one variety and avoid the tax, or the cheaper, with equally beneficial results.

The imports of sublimed sulphur to a single merchant in this city have cost California vineyardists in the past three years nearly \$15,000 duty, no benefits of which have accrued to our vineyards; and this, a loss to proprietors, adds another conspicuous monument to the long and unwholesome practice among some of our people of aping the French in everything.

We therefore conclude from the foregoing that "California sulphur" means sulphur from other countries, ground or sublimed only in California; and that for economy's sake, if any one insists on a foreign article, he should buy the ground sulphur and thereby escape the duty of one cent per pound.

Comparative Value of Ground and Sublimed Sulphur for Vineyard Use.—This much mooted question has been carelessly handled by many. First let us comprehend the effect of any sulphur distributed in the vineyard. Sulphur, in a fine condition, exposed to the atmosphere, undergoes a partial evaporation; the vapor produced comes in contact with the germs or organs of the *oidium* and accomplishes their destruction. Evaporation is, therefore, the result desired. This evaporation is particularly favored by exposure to the sun's heat, and especially when the ambient temperature reaches 70° F. or over.

Now, other things being equal, the finer the sulphur the greater must be the surface exposed, and consequently the more rapid the evaporation. Evaporation is the result desired. Sublimed sulphur is that produced by boiling crude brimstone and condensing the vapor thus formed in a closed chamber. In cooling the vapor the sulphur is recovered in little round globules. Several of these globules are usually attached and form a string in appearance when magnified, much resembling a string of beads. The sulphur in this shape exposes less surface than could be produced in any other form; so that with equal fineness, ground and irregular particles would better answer our purpose. To demonstrate this practically, two samples of the same sulphur accurately determined in weight, one ground and the other sublimed, were exposed to the same heat as if in the vineyard. Samples selected for this purpose were of apparent equal fineness. The same were weighed from day to day, and the experiment repeated several times; and the above conclusions were amply borne out in every weighing. Not only did the sublimed or flowers of sulphur evaporate less, but it also showed a more rapid formation of sulphuric acid than the ground sample, thus furnishing another objection to the use of sublimed sulphur; one which its exponents have frequently and incorrectly urged against the use of ground or triturated sulphur.

I have yet to know of any considerable damage done to vines by the sulphuric acid existing as an impurity in the commercial article, either ground or sublimed; though some have strongly urged the presence of sulphuric acid as an objection to ground sulphur. This is wrong, as there is every condition to favor the formation of sulphuric acid in the operation of subliming sulphur, and nothing to favor such formation in the grinding process. Specialists who have made this matter a thorough study, corroborate my conclusions.

I do not urge this as an objection to the use of sublimed sulphur, but if any disadvantage accrues from the presence of sulphuric acid, it must not be laid at the door of the ground sulphur.*

In connection with this, let it be known that neither subliming nor grinding does in anywise alter the chemical nature of sulphur, which is an ele-

*The presence of considerable quantities of sulphuric acid may be detected by the lumpy condition which results from its presence.

mentary substance and unalterable chemically, otherwise than by combining it with some other element or compound. It is not changed in its preparation as above named, any more than would be pure lead if made into shot by melting or by being cut to the proper shape. The same analogy holds true as to its source—pure lead from one mine or country is chemically identical with that from any other mine or country. So with sulphur from Sicily, from California, or any other country. This I state for the benefit of non-chemists, some of whom have thought prepared sulphur to be a compound altered from its elementary condition, and hence variable in strength.

One point favoring the sublimed sulphur is, that in preparing it the product is freed of the ashy impurity existing in the crude article of commerce, to the extent of from one to three per cent. This impurity, however, is a neutral volcanic ash, which works no injury to the vine, and in buying, ground sulphur can only be estimated as a loss of from one to three per cent—a loss which is in nowise commensurate with the difference in price of the two forms, ground and sublimed.

We find European authorities of the present date unanimous in the opinion that finely ground or triturated sulphur is more suitable for vineyard use than the sublimed.

Professor G. Foex, who is Director and Professor of Viticulture at the National School of Agriculture, at Montpellier, in his "*Cours Complet de Viticulture*," published in 1886, says:

Formerly, only sublimed sulphur was employed (in the vineyards) because it contained more sulphurous acid; but since, learning that the effect of the sulphur on the *oidium* is due to the vapor which it emits at an elevated temperature, a result obtained as well with ground as with sublimed sulphur, the former being considerably cheaper, has come into general use.

Furthermore, the use of flowers of sulphur is seriously objectionable, inasmuch as it consists of little globular particles which are readily lost from the foliage of the vine under the influence of a light breeze. Its application affects the workmen, too, with a trouble known as *ophtalmie des sulfureurs*—affecting the eyes.

The ground sulphur, on the contrary, which is made up of angular and irregular particles, adhere more closely to the green portions of the vine and trouble the workmen much less.

M. A. Du Breuil, M. La Forge, and others, express the same preference for finely ground sulphur.

How and When to Apply Sulphur.—For very small vineyards, the dredger, an instrument much resembling a large pepper box, answers well enough, especially while the vines are young. For more advanced vineyards and larger areas, the bellows should be used, holding from three to five pounds of sulphur. These latter are furnished by local manufacturers, and effect a considerable saving of time, labor, and material over the dredger. By the use of the bellows, too, the sulphur can be more evenly distributed. A simple open nozzle is the best; any perforated cover for this latter is apt to get clogged, and the bell-shape frequently given to it does not spread or expand the sulphur jet—a purpose for which it is designed but fails to accomplish. A bent nozzle is more of an incumbrance than an advantage. The simplest, strongest bellows of good size, will prove cheapest and best in the end. With this tool a workman will sulphur from five to eight thousand vines per day—vines in an advanced state of vegetation. He may apply as many pounds of sulphur per day with other instruments, but it can not thus be so evenly distributed nor cover the same area.

The powdered sulphur should be applied so as to lodge as much as possible on and near the growing parts of the vine. This secures a dense sulphur vapor in direct contact with the diseased organs. Sulphur on the old

stump, or even on the surface of the ground, will destroy the *oidium*, but a larger quantity would be required.

Sulphur falling on the ground is by no means lost, but a lesser quantity will answer if lodged on the leaves and branches. It has been stated that sulphur falling to the earth is lost by its effect being immediately neutralized. The sulphurous acid formed is neutralized, but the vapor of sulphur—the active disinfectant—is not neutralized; nor is the effect of the sulphur lost, except as it be covered up and hid from the sun and air.

The simplest rule as to the time for applying sulphur is: "Treat the vineyard whenever the disease makes its appearance." But, if we desire to apprehend even its introduction, which is the general custom in California, the first application should be made at or about the time of flowering, as at this period the disease is apt to attack the delicate organs of fructification and render the vine infertile. Altogether the most favorable results have been obtained by sulphuring at the time of blossoming. This, too, is one of the methods of combating *coulure*, a trouble which will be treated later on. Young vines do not require so frequent sulphuring, nor so great a quantity, as vines in full bearing. The former should be sulphured when the shoots attain the length of a few inches; and again, later on, if the *oidium* makes its appearance. Bearing vines should, in addition to the treatment at blossoming, receive a second application from the first to the middle of June, and again, later on, if the disease makes its appearance.

Wine grapes should never be sulphured after the berries attain their full size, as the sulphur reaching the wine vat is converted during fermentation into sulphureted hydrogen—the odor of rotten eggs—to the ruin of the product. Table or raisin grapes may be sulphured later if desired.

The quantity used at each application may vary with the number of vines per acre, and should be governed somewhat by the susceptibility of the variety as before explained. Less is needed for the first than for subsequent applications, when the vines attain full proportions. The quantity commonly used in California for old vines subject to *oidium*, is about eight pounds per acre for the first treatment, and from twelve to twenty pounds at the second application.

The use of this remedy in conformance with the above instructions, will effect a great saving over conventional methods pertaining at present in California. Not unfrequently our vineyardists sulphur in weather positively prohibitory to the disease. Varieties but little liable to *oidium*, situated, perhaps, in the hottest and driest interior localities, and trained low to escape it, often receive a dose which goes only to fertilize the soil and stimulate the growth of the vine.

This latter function is one which, however, must not be overlooked; the general aspect of the vine is always improved and vegetation greatly stimulated by the free use of sulphur. A small percentage only of the sulphur applied vaporizes—the balance works into the soil, becomes slowly oxydized, and finally unites to form sulphates of the alkalies and alkaline earths, which are in substance the essential ingredient of some of the best fertilizers. Still, it is well to know whether the sulphur is applied for the cure of *oidium* and as a fertilizer, or as a fertilizer only.

The most favorable hours for applying sulphur, are from 8 or 9 o'clock in the morning to the middle of the afternoon, preferably from 9 A. M. till 2 P. M. The sulphur which comes in contact with dew or other water, is in nowise altered thereby, but ceases to give off its vapor only until the water evaporates, and thereby exposes its surface to the atmosphere. A rain following the application of sulphur does not alter this element, but results

in damage only in removing the particles mechanically from the foliage of the vine to other places more remote from the seat of disease.

Any wind other than very gentle, will do much to shake off and remove the sulphur from the leaves. A windy day should therefore be avoided. In fact, a hot, still midday is best in all respects, as amply proven by the strong odor of sulphur prevailing at the time of such an application.

In purchasing sulphur, its quality and fineness may best be determined by the use of the microscope. The weight of a given bulk will establish the relative fineness, but cannot be used in comparing sublimed with ground, as the mechanical condition of the two are different—sublimed sulphur is in beaded strings, and occupies more space than ground sulphur, much as shavings are of greater bulk than sawdust. To persons experienced in its use, the fineness may be determined by the feeling—almost impalpable it should be. I have never known this sulphur adulterated, although ground sulphur is frequently added to the sublimed to enable the merchant to sell it cheaper. All samples of eastern sublimed sulphur examined, I have found mixed in this manner, showing that the credit of ground sulphur has sometimes been unconsciously extended to the so called and more expensive sublimed.

Where the question of purity or fineness arises with any vineyardist, samples may be sent to this office, where a prompt determination will be made and reported without cost to the applicant.

To further substantiate these recommendations of the ground sulphur, I will state that of the sulphur used of late years in California vineyards, over three fourths has been ground sulphur; and I have yet to know of any one employing sulphur extensively who has abandoned the ground, or even that ground in California for the foreign prepared or sublimed sulphur, which latter sells at one and a quarter to one and a half cents higher than the ground or triturated.

Ground sulphur may be easily distinguished from sublimed by the difference in color; the latter always shows more yellow, the former more white, or a lighter tint of yellow.

J. H. WHEELER,
Chief Executive Viticultural Officer.

THE PURE WINE BILL (with Comments and Explanations).

BEING

Appendix 2 to the Annual Report of the Chief Executive Viticultural Officer
FOR THE YEAR 1887.

NOTE.

To the Board of State Viticultural Commissioners:

GENTLEMEN: To answer at once the numerous inquiries put to us concerning the Pure Wine Law of California, now going into effect, I have thought proper to place in the hands of every viticulturist, wine maker, and dealer, the following copy of the law with the appended explanations and instructions.

Yours, very respectfully,

JOHN H. WHEELER,
Chief Executive Viticultural Officer.

San Francisco, May 25, 1887.

Substitute for Senate Bill, No. 219, adopted in Senate February 17, 1887—An Act to Prohibit the Sophistication and Adulteration of Wine, and to Prevent Fraud in the Manufacture and Sale Thereof.

The People of the State of California, represented in Senate and Assembly, do enact as follows:

SECTION 1. For the purposes of this Act, pure wine shall be defined as follows: The juice of grapes fermented, preserved, or fortified for use as a beverage, or as a medicine, by methods recognized as legitimate according to the provisions of this Act; unfermented grape juice, containing no addition of distilled spirits, may be denominated according to popular custom and demand as wine only when described as "unfermented wine," and shall be deemed pure only when preserved for use as a beverage or medicine, in accordance with the provisions of this Act. Pure grape must shall be deemed to be the juice of grapes, only, in its natural condition, whether expressed or mingled with the pure skins, seeds, or stems of grapes. Pure condensed grape must shall be deemed to be pure grape must from which water has been extracted by evaporation for purposes of preservation or increase of saccharine strength. Dry wine is that produced by complete fermentation of saccharine contained in must. Sweet wine is that which contains more or less saccharine appreciable to the taste. Fortified wine is that wine to which distilled spirits have been added to increase alcoholic strength, for purposes of preservation only, and shall be held to be pure, when the spirits so used are the product of the grape only. Pure champagne or sparkling wine is that which contains carbonic acid gas or effervescence produced only by natural fermentation of saccharine matter of musts, or partially fermented wine in bottle.

SEC. 2. In the fermentation, preservation, and fortification of pure wine, it shall be specifically understood that no materials shall be used intended as substitutes for grapes, or any part of grapes; no coloring matters shall be added which are not the pure products of grapes during fermentation, or by extraction from grapes with the aid of pure grape spirits; no foreign fruit juices, and no spirits imported from foreign countries, whether pure or compounded with fruit juices, or other material not the pure product of grapes, shall be used for any purpose; no aniline dyes, salicylic acid, glycerine, alum, or other chemical antiseptics, or ingredients recognized as deleterious to the health of consumers, or as injurious to the reputation of wine as pure, shall be permitted; and no distilled spirits shall be added except for the sole purpose of preservation, and without the intention of enabling trade to lengthen the volume of fortified dry wine by the addition of water, or other wine weaker in alcoholic strength.

SEC. 3. In the fermentation and preservation of pure wine, and during the operations of fining or clarifying, removing defects, improving qualities, blending and maturing, no methods shall be employed which essentially conflict with the provisions of the preceding sections of this Act, and no materials shall be used for the promotion of fermentation, or the assistance of any of the operations of wine treatment which are injurious to the consumer, or the reputation of wine as pure; *provided*, that it shall be expressly understood

that the practices of using pure tannin in small quantities, leaven to excite fermentation only, and not to increase the material for the production of alcohol; water before or during, but not after fermentation, for the purpose of decreasing the saccharine strength of musts to enable perfect fermentation; and the natural products of grapes in the pure forms as they exist in pure grape musts, skins, and seeds; sulphur fumes to disinfect cooperage and prevent disease in wine; and pure gelatinous and albuminous substances, for the sole purpose of assisting fining or clarification, shall be specifically permitted in the operations hereinbefore mentioned, in accordance with recognized legitimate custom.

SEC. 4. It shall be unlawful to sell, or expose, or offer to sell under the name of wine, or grape musts, or condensed musts, or under any names designating pure wines, or pure musts as hereinbefore classified and defined, or branded, labeled, or designated in any way as wine or musts, or by any name popularly and commercially used as a designation of wine produced from grapes, such as Claret, Burgundy, Hock, Sauterne, Port, Sherry, Madeira, and Angelica, any substance or compound, except pure wine, or pure grape must, or pure grape condensed must, as defined by this Act, and produced in accordance with, and subject to restrictions herein set forth; *provided*, that this Act shall not apply to liquors imported from any foreign country, which are taxed upon entry by custom laws, in accordance with a specific duty, and contained in original packages or vessels, and prominently branded, labeled, or marked, so as to be known to all persons as foreign products, excepting, however, when such liquors shall contain adulterations of artificial coloring matters, antiseptic chemicals, or other ingredients known to be deleterious to the health of consumers; *and provided further*, that this Act shall not apply to currant wine, gooseberry wine, or wines made from other fruits than the grape, which are labeled or branded, and designated and sold, or offered, or exposed for sale, under names including the word wine, but also expressing distinctly the fruit from which they are made, as gooseberry wine, elderberry wine, or the like. Any violation of any of the provisions of any of the preceding sections shall be a misdemeanor.

SEC. 5. Exceptions from the provisions of this Act shall be made in the case of pure champagne, or sparkling wine, so far as to permit the use of crystallized sugar in sweetening the same according to usual custom, but in no other respect.

SEC. 6. In all sales and contracts for sale, production, or delivery of products defined in this Act, such products, in the absence of a written agreement to the contrary, shall be presumed to be pure, as herein defined, and such sale or contracts shall, in the absence of such an agreement, be void, if it be established that the products so sold, or contracted for, were not pure as herein defined. And in such case the concealment of the true character of such products shall constitute actual fraud for which damages may be recovered, and in a judgment for damages, reasonable attorney fees to be fixed by the Court, shall be taxed as costs.

SEC. 7. The Controller of the State shall cause to have engraved plates, from which shall be printed labels, which shall set forth that the wine covered by such labels, is pure California wine in accordance with this Act, and leaving blanks for the name of the particular kind of wine, and the name, or names, of the seller of the wine, and place of business. These labels shall be of two forms or shapes, one a narrow strip to cap over the corks of bottles, the other, round or square, and sufficiently large, say three inches square, to cover the bungs of packages in which wine is sold. Such labels shall be furnished, upon proper application, to actual residents, and to be used in this State only, and only to those who are known to be growers, manufacturers, traders, or handlers, or bottlers of California wine; and such parties will be required to file a sworn statement with said Controller, setting forth that his or their written application for such labels is and will be for his or their sole use and benefit, and that he or they will not give, sell, or loan such label to any other person or persons whomsoever. Such labels shall be paid for at the same rate and price as shall be found to be the actual cost price to the State, and shall be supplied from time to time as needed, upon the written application of such parties as are before mentioned. Such label, when affixed to bottle, or wine package, shall be so affixed, that by drawing the cork from bottle, or opening the bung of package, such label shall be destroyed by such opening; and before affixing such labels all blanks shall be filled out by stating the variety or kind of wine that is contained in such bottle or package, and also by the name, or names, and post office address of such grower, manufacturer, trader, handler, or bottler of such wine.

SEC. 8. It is desired and required that all and every grower, manufacturer, trader, handler, or bottler of California wine, when selling or putting up for sale any California wine, or when shipping California wine to parties to whom sold, shall plainly stencil, brand, or have printed where it will be easily seen, first, "Pure California Wine," and secondly, his name, or the firm's name, as the case may be, both on label of bottle or package in which wine is sold and sent, or he may, in lieu thereof, if he so prefers and elects, affix the label which has been provided for in Section 7. It shall be unlawful to affix any such stamp or label as above provided to any vessel containing any substance other than pure wine, as herein defined, or to prepare or use on any vessel containing any liquid, any imitation or counterfeit of such stamp, or any paper in the similitude or resemblance thereof, or any paper of such form and appearance as to be calculated to mislead or deceive any unwary person, or cause him to suppose the contents of such vessel to be pure wine. It shall be unlawful for any person or persons, other than the ones for whom such stamps were procured, to in any way use such stamps, or to have possession of the same. A violation of any of the provisions of this section shall be a misdemeanor, and punishable by fine of not less than fifty dollars, and not more than five hundred dollars, or by impris-

onment in the county jail for a term of not exceeding ninety days, or by both such fine and imprisonment. All moneys collected by virtue of prosecutions had against persons violating any provisions of this or any preceding section, shall go one half to the informer and one half to the District Attorney prosecuting the same.

SEC. 9. It shall be the duty of the Controller to keep an account in a book to be kept for that purpose, of all stamps, the number, design, time when, and to whom furnished. The parties procuring the same are hereby required to return to the Controller semi-annual statements under oath, setting forth the number used, and how many remains on hand. Any violation of this section, by the person receiving such stamps, is a misdemeanor.

SEC. 10. It shall be the duty of any and all persons receiving such stamps to use the same only in their business, in no manner or in nowise to allow the same to be disposed of except in the manner authorized by this Act; to not allow the same to be used by any other person or persons. It shall be their duty to become satisfied that the wine contained in the barrels or bottles is all that said label imports as defined by this Act. That they will use the said stamps only in this State, and shall not permit the same to part from their possession, except with the barrels, packages, or bottles upon which they are placed as provided by this Act. A violation of any of the provisions of this section is hereby made a felony.

SEC. 11. This Act shall take effect and be in force ninety days after its passage.

This law goes into effect and becomes operative on June 5, 1887.

In section ten of the above law will be found the following:

"It shall be their (those employing the stamp) duty to become satisfied that the wine contained in the barrels or bottles is all that said label imports."

As there are many dealers who will employ the stamp on wines, bottled or packed by them in small packages, which wine they receive from others in larger packages, coming to them covered by the State stamp of purity, the question arises as to the liability of such bottler and what would constitute, in the eye of the law, the "duty" of the said bottler in determining that the wine employed was true to label.

The answer to this question has been kindly furnished to me as follows, by Attorney-General Johnson:

SACRAMENTO, May 19, 1887.

J. H. WHEELER, Esq., 204 Montgomery Street, San Francisco:

DEAR SIR: Answering your inquiries as to the Act to prohibit the sophistication and adulteration of wine, etc., approved March 7, 1887.

You make a hypothetical case for my opinion: "A buys an adulterated wine from B, with a pure wine stamp over the bung. A bottles the wine and puts the pure wine stamp on the bottle, believing the wine to be pure. Subsequently the wine is found to be not pure. Is A then liable?"

It won't do for A to trust implicitly B or his stamps. The Act requires some diligence on A's part. It says that it shall be his duty to become satisfied that the wine contained in the barrels or bottles, is all that said label imports as defined by this Act.

A therefore must not be guilty of criminal negligence. That would be as bad as if A's intent was to palm off adulterated or impure wine.

But if A makes a reasonable effort, in good faith, to satisfy himself that the wine is all that the label imports, and is satisfied, after using due diligence, he would not be guilty of a misdemeanor, if he was mistaken or imposed upon. It is the good faith of A, and the use of due diligence and scrutiny in his investigation, which the law requires. I do not think an analytic test is necessarily required to be applied by A. That might not at all times be practicable. But he must recollect that there is a duty cast upon him to satisfy himself by available and reasonably reliable means that the wine is what the label imports, and he must be satisfied.

An analysis, however, would be the most satisfactory way to test the wine.

Very truly yours,

G. A. JOHNSON,
Attorney-General.

Other than this the law seems to be sufficiently clear to need no further explanation. Particular attention is called to Section 6, which renders the sale of anything purporting to be wine—in the absence of a written agreement to the contrary—void, and the vender liable for damages if it be not pure as specified in the law. According to the framers of this law, this, whether it bears the pure wine stamp or not, is the effective clause, and, coupling with it the liberal recompense to the informer and the prosecuting attorney, we have incentive sufficient to greatly facilitate its enforcement.

WINE ANALYSIS.

Whenever it becomes necessary or desirable that a wine be analyzed for the benefit of a dealer, vine grower, or any person whatsoever, pursuant to the enforcement of the above law, a sample of the same may be sent to the Secretary of the Viticultural Commission, by whom an analysis will be procured from the State Analyst and a ready report made as to its purity. The machinery for this latter work was obtained in an Act passed by the State Legislature entitled: "An Act to provide for analyzing the minerals, mineral waters, and other liquids, and the medicinal plants of the State of California, and foods and drugs, to prevent adulteration of the same. Approved March 9, 1885."

This law provides that the Governor of the State shall appoint one of the Professors of the University of California as State Analyst, whose duty it shall be to analyze all articles of food, drugs, medicines, medicinal plants, etc., manufactured, sold, or used in this State, when the same shall be properly submitted to him. The law then prescribes the methods by which the samples of various articles shall be obtained and submitted for analysis, and specifies that the Board of State Viticultural Commissioners shall have the privilege of submitting to the State Analyst samples of wines, grape spirits, or liquids or compounds in imitation thereof, for analyses, as follows:

Any person desiring an analysis of such products may submit the same to the Secretary of the State Viticultural Commissioners, who will transmit them to the State Analyst in the manner prescribed. The analyses shall be made and the certificate of the same shall be forwarded to the Secretary of the Viticultural Commission. This certificate, as the law reads, shall be held in all Courts of this State, as *prima facie* evidence of the properties of the articles analyzed by him.

Thus it may be seen that there lies within the reach of every wine maker or dealer, an easy means of obtaining, without expense, uncontrovertible evidence, wherever fraud is supposed.

Unfortunately, this law appropriated no money for the carrying on of the work required. Realizing the importance of such a bureau and its maintenance, however, the Viticultural Commission has shared its endowment with the State Analyst, and will continue to do so, in order to lend all of the aid they can to the support of the law. Pursuant to the requirements of the Act, W. B. Rising, Professor of Chemistry at the State University, was duly appointed State Analyst. An assistant has been employed, and he is now ready for and engaged in the examination of wines, the purity of which can be quickly determined and the report made available in a few days after delivery of the samples to our Secretary.

Concerning the expense of maintaining the State Analyst's Bureau, it is hoped that the Board of Regents of the University, in their manifest desire to aid the cause of viticulture, and in view of the liberal endowment made

them in the last Legislature, will come to the assistance of the Commission in the support of the analytical work.

THE STAMPS.

Section seven provides that on application the necessary stamps shall be furnished by the Controller.

Here again, the Legislature made no appropriation with which to purchase the plates necessary for printing the stamps, and the liberality of the Viticultural Commission is drawn upon, they having consented to supply the first cost.

One hundred thousand stamps have already been printed by the State Controller, and will be ready for distribution when needed. Their cost will be \$1 50 per M. with expense of delivery added. The stamp for bottles may be easily affixed thereto; that placed over the bung of a barrel will need the protection of a piece of tin such as is ordinarily affixed to the bung of a barrel previous to shipping.

The following committee of vine growers, to see to the enforcement of the law, has been appointed by H. W. McIntyre, President of the State Vine Growers and Wine Makers' Association: Hon. M. M. Estee, Napa; J. B. J. Portal, San José; Captain Chamon de St. Hubert, Fresno; J. H. Drummond, Glen Ellen; H. A. Pellet, St. Helena; Jacob Schramm, Calistoga; H. A. Meriam, Los Gatos; B. H. Upham, San Francisco; A. Erz, Anaheim; Julius P. Smith, Livermore. To these others will be added soon. This committee will proceed to collect miscellaneous samples of wine found throughout the city and State, which, if proving spurious, will be turned over to the District Attorney, and the case submitted to the Courts.

The Pure Wine Act, at the time of its passage by the last Legislature, was the subject of considerable criticism and dispute.

It was discussed at great length before the public; but, having ended in adoption and approval, it is to be hoped that the little inconvenience it may make a few will be amply compensated for by its good effect on the general industry. If it opens the way to any fraud we may be sure this clause will be used by the enemy, to counteract the effect of which every good feature of the law must be brought into requisition.

Many demanded the use of certain materials in preparing wine, which materials to them seemed harmless, but which had to be denied, in order to exclude other more damaging adulterants. For example, we may well afford for the market within our own State to abandon the use of ordinary grain spirits in fortifying wines, if, by the law, we are able to stop the extensive and unhealthful practice of stretching, produced by the same means.

Nor must we forget the effect of this Act in enlarging the demand for grape spirits, and thereby causing the distillation of poor wines, which would otherwise be fortified by neutral spirits, and usurp the place of better wines. By this Act a native spirit is substituted for an imported one.

The healthful effect of our wines, and a consequent increased local consumption, will be greatly promoted by substitution of grape spirits for cheaper poisonous spirits.

Several have already indicated their intention of using the State stamp on small packages. On bottles, particularly, will the practice be adopted, and here it will be of use. When the public demand the pure wine stamp on the bottles, as they will do when knowing its value, and finding some merchants who employ it, the trade will be forced to supply them pure wine, and that under a California label. A large portion of the native

wine sold in bottles goes to-day to the public with a fictitious label of foreign import. The presence of the stamp will bring to public recognition the name and trademark of California producers, where heretofore the bottle has been branded "Chateaux La Rose," "Chateaux Margaux," or "St. Julien."

Whether the use of the stamp on large packages going out of the State will be harmful or otherwise, the use of the same on bottled wines must certainly result in good.

It has been suggested that the Controller's list of those dealers making application for the stamp will prove a valuable directory for the use of purchasers. It is to be hoped it may.

Dealers have now had ample time for working off their suspicious products; and every opportunity has been given those who—perhaps with honest motives at first—have been forced into the use of cheapening processes by harmful competition, to start anew on a fair, square basis, with an easy redress from others competing by dishonest means.

Whatever effect this law may have, it will aid in forming a standard of excellence founded on quality, and not alone on price. The latter has proved the ruinous measure by which our wines have been gauged and marketed—a measure by which they have been caused to degenerate rather than advance. Good wine continues to improve, and will pay to keep. Poor wine will rapidly deteriorate, and if not allowed to be drugged, must go either to the distillery or to be made into vinegar.

If this law becomes effective, which depends mainly on the patronage of the wine-drinking public, it will double the California market for good wine. Its success will send the poor wine to the distillery, the sale of which has dragged down the price of the better product to ruinous figures; figures which preclude the possibility of marketing any choicer grades for the general public.

CIRCULAR OF INSTRUCTIONS TO INSPECTORS.

STATE OF CALIFORNIA, BOARD OF STATE VITICULTURAL COMMISSIONERS.)
OFFICE OF THE CHIEF EXECUTIVE VITICULTURAL OFFICER,)
SAN FRANCISCO, June 25, 1887.)

DEAR SIR: By resolution, unanimously adopted at a meeting of the Board of State Viticultural Commissioners, held on the thirteenth instant, the Chief Executive Officer was instructed to issue a circular to all local resident inspectors throughout the State, calling upon them to report, promptly, to this body, whenever they discover any violation of the pure wine Act in the employment of materials forbidden by this law to be used in the manufacture of pure wine.

I take the earliest opportunity of communicating to you this wish of the Board; and, although hoping you may never be called upon to report any transgression of the new law, I trust you will not hesitate to do your duty as an officer of the Board when occasion may require.

Yours, very respectfully,

J. H. WHEELER,
Chief Executive Officer.

BLEACHING SEEDLESS SULTANA RAISINS,

BEING

Appendix 3 to the Annual Report of the Chief Executive Viticultural Officer
FOR THE YEAR 1887.

The area planted to the Seedless Sultana grape in California was greatly augmented in 1881, 1882, and 1883, during which time it was in great favor with many. After 1884 the planting of this variety nearly ceased, and it is not at present a popular grape for either wine or raisins. The market is easily glutted with its raisins, and the wine has, with few exceptions, proved other than satisfactory. Prominent among other objections has been its tardiness in coming into bearing—generally this variety must have attained the age of at least five years before it sets a good crop. When once well in bearing, however, it is regular and very prolific; it has been known to produce as much as fifteen tons per acre.

The extensive plantations of Sultanas made at first are now coming well into bearing, and the matter of preparing the raisins for market is one of considerable interest and inquiry. Letters have come to me asking for full instructions as to the best methods of bleaching, drying, and marketing the grapes.

The imported Sultana raisins come to our markets bleached; they are translucent and nearly colorless—more so than any I have yet seen prepared in California. These command better prices than the domestic Sultanas. Bleaching and drying these raisins has been carried on here by a very few, and their experiments have been limited. Some good results have been obtained, and it is the experience which has grown out of these successes which I am here able to produce.

Mr. W. B. West, of Stockton, has been the early pioneer in the matter of Sultana raisins, having cultivated this grape for upwards of twenty years. In drying them he was first to employ bleaching, the details of which he had learned in Europe, and, after a trial, he communicated his experience to Messrs. W. T. Coleman & Co., who have since furnished this, together with other information, to some of their customers.

Prominent among others who have prepared bleached Seedless Sultana raisins are Jackson Brothers, N. Wyckhoff, and Wm. Forsyth.

I give, in the following directions for the work, the latest instructions produced by the commission house of W. T. Coleman & Co., together with such changes and additions as have been suggested by Mr. W. B. West and Byron Jackson. These gentlemen have kindly assisted me in the matter.

DIRECTIONS.

For the best results the grapes must not be picked until they are fully ripe. This is indicated, in bunches not too much shaded, by the bright amber color of the skin, which, however, fails to appear in grapes hidden from the light and sun. A certain determination of full ripeness may be had by pressing the clear juice from the grapes thought to be ripe, on each of several successive days, at each pressing determining the sugar by means

of a must scale, and when the amount of sugar shows no increase from day to day, the grapes are ripe. In making these tests care must be taken that no bad bunches enter the samples, as whole bunches of Sultanas are sometimes found which never sweeten; these should be carefully excluded throughout the treatment.

More care is necessary in determining the perfect ripeness of the Sultana than is the case with the Muscats, as when at all green the large amount of acid so common to this variety renders them almost valueless. Even when drying, the bunches, being large and dense, should be carefully examined to see that they are ripe throughout.

Before picking, everything should be in readiness for bleaching. The necessary preparations are as follows:

A kettle, or kettles, holding twenty gallons or more, proportioned to the amount of work to be performed, should be ready to heat up. The work of dipping the grapes into the lye solution may be done in the kettles, if necessary, but for convenience it is best to have a wooden trough built at which a number of persons can work. This trough should be provided with a sheet-iron bottom, and built over a brick fireplace, such that the heat of the solution may not be lowered by the dipping.

The lye solution used thus far in California has been made of concentrated lye, dissolved in water just below the boiling point. In Smyrna, however, the practice has been to use instead of concentrated lye, consisting in our market of impure and variable caustic soda, the potash lye obtained by leaching the ashes produced by the burning grapevine brush. The superiority of the imported Sultanas would hence lead us to infer that potashes, which is the alkalic obtained from ashes, or better still, the pearl-ashes, which consist of purified potashes, could be substituted for concentrated lye to advantage. The last named potash salt is dearer than any of the others, but the quantity consumed is so small that no hesitation should be had in substituting this clean and wholesome salt for the soda salt, so uncertain in composition, and impure. Another advantage growing out of the use of pearlashes would be that of preserving the raisin in a soft, jelly-like condition, with a clear, glossy skin, more inviting far than the dry, chip-like raisin sometimes produced by the overdrying of raisins dipped in caustic soda.

The proportions recommended and employed heretofore have been: one pound of concentrated lye to five gallons of water. To make an equally caustic potash solution would require about one and one half pounds of pearlashes to five gallons of water. The price of pearlashes, which consist of pure carbonate of potash, varies from eight to ten cents per pound, according to quality.

Another indispensable provision is to secure facilities for rinsing the fruit in cold water immediately on its removal from the hot lye solution. The best rinsing may be done in running water, but when this is not practicable a barrel or tank may be used, care being taken to renew the water frequently in order that it may not become so charged with the lye as to improperly perform the rinsing.

A dripping rack may be had above the trough or tank by placing cleats or strips across, on which the trays may stand a few moments after removing from the bath. They should be well drained when removed from the rinsing water, otherwise a drop will form and dry up on the under side of the raisin, leaving a dark spot when cured.

To add to the soft, glossy appearance of the skin, a quantity of pure olive oil should be provided, which may be added to the dip on which it floats. The oil for this purpose should be pure. To insure purity it is

safest to use oil produced in California. Glycerine is highly recommended for the same purpose—some claim that it is superior to oil, and being cheaper may be used more freely.

The apparatus being in readiness, and the grapes ripe, the lye should be put in solution and heated. The potashes being all dissolved, the oil or glycerine may be added at the rate of half a large spoonful now and then as it disappears on the grapes. If oil be used, the proper amount will give to the solution a distinct amber shade.

As little time as possible should elapse between the period of picking the grapes and that of dipping the same. A great deal depends on this, as any delay in getting the grapes into the lye will make the work more difficult and the result more uncertain.

Some recommend picking the grapes in baskets or buckets of perforated tin, in which, without transfer, they may be immersed in the dip. Mr. Jackson places the grapes on a tray made with a frame of iron, which is covered with wire gauze with one quarter-inch mesh. The frame projects upwards on the sides to prevent the fruit floating off when in the dip, and is made to receive, as a cover, the wooden tray on which the fruit goes to the drier. When dipped and rinsed, the wooden tray is placed over the dipping and two men transfer the fruit by turning over the two. This system I believe is superior to all others, and economizes time and labor in the curing.

The time which the grapes should continue in the dip will vary with the locality. In some districts they possess thick skins, thus requiring a longer submersion than when the skins are thin and delicate. From one to two minutes is the prescribed time—experience and observation are the best guides. The dipping causes the skin of the grape to crack, at which time they are dipped enough and should be removed.

After dipping and a moment's draining over the trough, they should be rinsed thoroughly by immersing them in the pure water of the rinsing trough, after which drain well, long enough to allow all of the water to run off which will run off. After transferring as above, the drying may be conducted as for other raisins.

If the drying be conducted in the open air, and the heat of the climate will permit, the trays should be stacked immediately one above the other, up to a convenient height for handling. Sultanas dried thus in the shade will profit much more by the bleaching than if exposed to the direct rays of the sun. A building through which the draught draws strongly and warm is the best for open air drying.

When the drying is complete, the bunches should be gently rubbed over a sieve with fine meshes, to remove the stems, which will then come off readily.

When thus finished, the raisins should be packed in regular raisin boxes, which, according to W. T. Coleman & Co.'s instructions, should contain just twenty-five pounds, net weight. Use only one plain single paper wrapper around them all. Over the top face of the raisins, between them and the leaves of the paper wrapper, insert a piece of confectioner's wax paper; this done, your product is ready to enter the market in competition with those similarly prepared in Smyrna.

Besides adding to the appearance of the Sultana raisin, this operation increases perceptibly the weight of the finished product, greatly bettering it by the moisture-retaining power of the potash.

The process of bleaching, I am informed, adds 25 per cent to the selling price of the raisins. Messrs. W. T. Coleman & Co. put the profit a little

lower than this. Such being the case, those drying Sultanias cannot afford to long avoid the simple addition of the bleaching process.

Bleaching as applied to Muscat raisins, has never become popular in this country, nor is it certain that any common preference could be formed to make the process common. There are those who prefer bleached Muscats, and we already find quite a market. Their preparation is therefore worthy of the attention of some of our growers and curers of the Muscat.

The most beautiful, large seeded, and high priced raisins prepared in Smyrna, are bleached as above, and make a most inviting fruit. Well prepared, I believe they would form a novelty, which would prove profitable at least in limited quantities.

HOW TO AVOID AND CORRECT IMPERFECT FERMENTATION,

BEING

Appendix 4 to the Annual Report of the Chief Executive Viticultural Officer
FOR THE YEAR 1887.

The number of grape growers who have this year become wine makers for the first time warrants the publication of a few rules for the management of troublesome fermentation. Dry seasons are particularly productive of what, in California wine makers' parlance, are known as "stuck wines." These are wines which fail either in commencing or completing their fermentation.

TO START FERMENTATION.

Wines which are slow to commence fermentation are easily started. This trouble occurs most commonly with the first grapes crushed, particularly where they lay exposed to the chilling effects of a cold night and are crushed early in the morning, before being again warmed by the sun. The must is then apt to lie dormant in the fermenting vat for several days before the germs show any healthy action. The same delay in starting is sometimes produced in grapes crushed for white wines, when the must is run into the barrels exposed out of doors over night, thereby becoming cold. The delay in starting these cold musts is seldom productive of any great evil; but the annoyance and loss of time caused thereby may be completely avoided by crushing the grapes when warm, and then protecting the must against any considerable reduction in temperature.

The temperature most favorable to the action and development of the yeast germ ranges between 75 and 85 degrees. The fermentation would, therefore, be greatly aided in starting by bringing the new must to this degree of heat, and maintaining it thus until a good, healthy action prevails, after which the heat produced by the ferment will be sufficient.

If the grapes have been chilled before crushing, it is well, in addition to the warming, to add a little clean, fresh yeast. The best for the purpose is the compressed yeast, sold in small cakes throughout California; although any well-washed fresh yeast will do. Some wine makers always introduce this yeast into the first must to insure a prompt commencement.

Once the yeast plant gets established in any vat of the fermenting room it readily takes possession, unaided, of all the must subsequently introduced.

There are some wine makers, however, who insure a prompt start of each vat after the first, by mixing in some of the lees or yeast of a working or previously finished must.

To raise the must to a suitable temperature, a steam coil may be used. In districts where the sugar runs high, the steam is blown directly into the must by means of a hose, the opening of which is placed within and near the bottom of the tank. Where steam cannot be had, portions of the liquid may be heated successively, and returned to the vat or cask, until the whole marks 70°, or over. In doing this, the heated portions should not reach a temperature exceeding 125°. Under peculiar circumstances

the yeast plant will stand a temperature approaching 140°, but it would not generally be safe to heat it above 125°.

Very low temperatures, if not changing too suddenly, do not destroy the yeast plant, but render it temporarily dormant and unproductive.

Some wine makers deprecate the use of yeast as injurious. I have yet to learn, however, of any deleterious results accruing therefrom. Some even resort to a handful of grape leaves, or other material claimed to assist the must in starting.

MUSTS HIGH IN SUGAR.

The trouble in starting the first vat is small as compared with what often comes later, especially when the weather is dry and hot, or when the must shows 26, 28, or 30 per cent of sugar. Then comes the new wine makers' trial, and with old ones, too, the trouble not infrequently begins.

Without attempting to explain the causes which may lead the wine to cease fermenting, I will proceed to state the best and commonly adopted methods of avoiding the trouble, and the best methods of finishing wines "stuck" with from 2 to 8 per cent of sugar.

When the season is dry, and the must marks over 24 per cent saccharine, especially if the atmosphere seems wanting in moisture, and there is an absence of dew, fog, or rain, the utmost care should be exercised to avoid any other causes liable to obstruct fermentation in red wine.

SHALLOW VATS.

Shallow vats are invaluable for disposing of troublesome red musts, principally because of the ease with which the same may be worked and aerated; also, because the mass is so spread out as to avoid the excessive accumulation of heat.

For these reasons cement vats are preferred in many of the southern districts of Europe, where wine makers are similarly troubled.

These vats are made large and shallow, so that the must may be continually stirred and worked over. The cement answers better than wood, as it serves to carry off the heat which accumulates too rapidly in some districts of the South. Some wine makers, I have learned, ferment commonly in wood, but have their cement vats, to which the "stuck" wines are relegated when they chance to occur.

Next in value to a shallow vat is a shallow mass in a deeper tank, which serves somewhat to alleviate the impairment of the ferment, but this is never equal to the shallow tank in seasons of excessive sugar.

THE USE OF THE STEMS IN FERMENTING.

Fermenting on the stems aids the process, and may be safely adopted in red wines, if they be found ripe enough. When the butt of the stem is brown and woody, and the whole possesses a tough and wiry appearance—not green, brittle, and sappy—it may be safely added, and will aid greatly in avoiding trouble later on, though increasing somewhat the work of stirring.

Much difference in opinion prevails as to whether the use of the stems improves the wine or not, and this, too, among competent wine makers; some ferment all red wines on the stems, while with others they are never employed. The best authorities, however, agree on their value, being governed by circumstances, the season, ripeness of the grapes, etc., as to the quantity to be used. In the case of troublesome wines which we have

under consideration, it is doubtless best to employ part or all of them. They are needed not only to assist fermentation, but to increase the acid of the wine—wanting usually in this respect in seasons of overripeness. Such wines, too, can safely stand some of the harshness arising from the stems, which will also give them keeping quality.

I should never counsel the use of stems that are green, brittle, and sour, but as those seldom accompany troublesome seasons, they need hardly be mentioned.

BLENDING IN THE FERMENTING VAT.

The fermenting together of different varieties, or of the same variety from different soils, is a method well to adopt in seasons when trouble is apprehended. Red grapes generally ferment better when ten, or more, per cent of white grapes are added. The fine wines of Europe are often made in this manner, the quality being improved by the process.

If, for fear of losing color, or other reasons, the white grapes cannot be had, the blending of two or more varieties of red grapes will prove healthful to the ferment, and will make, too, a valuable blend if mixed intelligently with a previous knowledge of the qualities of each, and their appropriate proportions.

In filling the vats, if the first crushing runs high in sugar, the balance should be made up of grapes running enough lower to bring the whole to a medium strength.

PROPER MATURITY.

It is difficult to indicate the exact degree of sugar desired in all cases, in that it should be governed largely by circumstances. It is safe to say that wines seeking an early market will profit by all of the sugar which can be fermented out. Wines lacking in color will be improved by as complete maturity of the berry as is possible to ferment dry; in fact, there is everything in favor of complete maturity of the grape, except the difficulty produced by its fermentation. Not only does it become difficult to manage the fermentation, but when too high in sugar, the wine resulting, though apparently dry, may possess sugar sufficient to trouble it for years after.

These considerations must all be known in limiting the maturity of the grape, and in determining at what degree they should be picked.

By a little attention to the mixing of the grapes at time of picking, all of the good qualities may be obtained in a single vat, each lot performing its proper function. Not infrequently, however, we find varieties picked and fermented separately, each making a wine which possesses some excess or defect, but which would be corrected by judicious blending with some other variety or lot, possessing a corresponding defect or excess, be it color, acidity, strength, or harshness.

FERMENTING WITHOUT CRUSHING.

Where there is any promise of trouble in fermentation some wine makers resort, with red wines, to what is known as the "Morel process," viz.: that of placing the grapes directly in the tanks without either stemming or crushing. The mass is stirred and worked an unusual amount to start fermentation, which then continues slow and uniform, and usually finishes without trouble. The greatest objection urged to this method is, that in the subsequent pressing of the pomace, some grapes that were not ripe enough to ferment and break, are here opened, and contribute a certain amount of sugar to the liquid, by this time supposed to be dry. Drawn into sulphured

tanks or a cool cellar for keeping, this sugar manifests itself later on, to the great annoyance of the maker and detriment of the wine. This objection may, however, be overcome by arranging to continue fermentation of the wine when pressed, or, better still, by keeping the press wine separate for further fermentation, or brandy making, retiring only that to the keeping cellar which comes off without pressing.

Be it known that this process conduces to slow, uniform, and complete fermentation of just those berries which are ripe enough to make the best wine, and that this drawn off without pressing separates the better from the poorer wine. The method is by no means common, though it has afforded satisfactory results in many cellars, and proved an efficient preventive of tumultuous and incomplete fermentation.

Stemming without crushing has often been substituted for the Morel process, and with best results, in that, by the breaking of the riper grapes, it starts a uniform fermentation from the commencement.

WATERING THE MUST.

As a last resort, when the must marks 28 per cent of sugar, or over, water may be used for extending the same. This method is recognized as legitimate by the Pure Wine law of California. It is employed freely by some vineyardists, and authorized by many good authorities. Others there are who contend strongly against it, and there are laws in Europe prohibiting it.

Without entering into a discussion, as to its merits or demerits, I should advise that musts, showing too high a percentage of sugar, should, in the absence of other and better remedies, be reduced with pure fresh water, or else fermented with a view to making port wine.

The addition of water alone to high musts will not always insure perfect fermentation, as many people suppose. To obtain the best results, however, the water should be added as soon as the grapes are crushed, and it should be then well incorporated with the mass—bearing in mind that the addition of this, as of any other substance not coming directly from the vine, should be used only as a last resort. To extend the must with water, it is found that about five gallons of water are required to reduce the must from a ton of grapes, 1 per cent in sugar. For example, to reduce one ton of must from 28 per cent to 25 per cent would require about fifteen gallons of water.

Concerning the use of water in extending the must, I have found that wines so produced do not possess the keeping qualities found in others. Acetic fermentation sets in immediately on the opening of the bottle or package.

OTHER AIDS TO FERMENTATION.

Œnotannin and cream of tartar are employed by some to assist fermentation, and are valuable for either white or red wines. These substances produce, it is claimed, desirable qualities in the wine, and improve the color of red wines. Their use is permitted and recognized by our law as harmless. When employed for red wines, they should be sprinkled over the must at the time the grapes are crushed, at the rate of two ounces of œnotannin and one half pound cream of tartar to each ton of grapes. Thus used they have been found to make the fermentation regular and uniform, and will cause the wine to clear readily when drawn off.

STIRRING THE MUST.

Complete and constant stirring forms a valuable adjunct to fermentation at all times; particularly is it necessary when the must is hottest and most active. The measure of success is not infrequently determined by the amount of working over the wine receives. In working red wines in high tanks, this is done with a tool made of a piece of scantling about six feet long, enlarged by cross-pieces, or even cleats, nailed on at the lower end. A cross-piece answers for a handle at the top. A close-tined stable fork, or other more effective tool, may be employed if the tank be shallow and the must is not too deep.

THE "STUCK" TANK.

If selecting and adopting in advance of the work proper precautions, as above described, there is seldom cause for further trouble.

There often occur, however, through carelessness or otherwise, tanks "stuck" at from 2 to 8 per cent of sugar. The wine has commenced fermenting all right, has boiled up tremendously, to the intense delight of the maker: when, lo! on coming out the next morning, the cap has dropped; the wine has become inactive and cold; the bubbles have almost ceased to rise, and yet the must marks several degrees of sugar remaining.

There is one common and usually effective proceeding to start up fermentation.

The wine, or partly finished wine, if for claret, should be drawn off, and the pomace pressed and rejected, or sent to the distillery. Let the wine so drawn be placed in two or more tanks, and an equal bulk of fresh grapes added. For the best results the grapes added should be, if possible, some variety known to produce good fermentation. See, too, that they are low in sugar. If such grapes are not available, secure the same variety from some other locality or soil, taking care that they are as low in sugar as possible—but not green.

The desired result has often been obtained by drawing the stuck wine directly on to newly crushed grapes of the same kind, and from the same place; but there is greater assurance of success when the variety or locality is varied somewhat, and the grapes chosen are lower in sugar. White wines should be pumped on to new must in a similar manner.

ERRORS OF BEGINNERS.

New wine makers are prone to fall into the error of only half doing the work of refermenting by adding a few boxes of fresh grapes to the stuck tank, expecting thereby to complete fermentation. This has been known to succeed in rare cases, when the trouble was light and the variety added was Berger or some other—noted alike for its low saccharine and favorable fermenting qualities. Generally, however, it is time thrown away to do other than what I have indicated at first, viz.: If red wine, draw off the wine, press and reject the pomace, and commence fermentation on newly crushed grapes. If this fail—which it will do but rarely—the maker can try the same again, employing fresh grapes of some other variety, still lower in saccharine, and combining all of the precautions indicated in the first of this article; or, if these latter are unsatisfactory, it may be necessary to reduce the newly mixed must to about 24 or 25 per cent sugar by the addition of water. If all of these fail there is left no alternative but to

make port wine, or send it to the distillery. There is rarely any necessity of this latter extreme if the first instructions I have given are followed.

In place of pumping the stuck wine on to new pomace some wine makers prefer to let the fermentation finish in casks or tanks. This it will do if small packages be employed and they be kept in a favorable temperature. Nothing, however, is so certain of good results, nor so frequently practiced, as the method of renewing fermentation on new pomace, or new must, if for white wine, and finishing the wine up before the final drawing or pressing.

I have not attempted here in this hurriedly prepared article to explain the reasons why these troublesome fermentations occur. There are many theories as to their causes, and great difference of opinion exists unnecessary for me to discuss at this time. We know the circumstance under which the troubles usually occur and the methods of their avoidance. These methods—most of them well known to old wine makers—I have aimed to present at this appropriate moment. This is done more in view of keeping the inexperienced out of serious trouble by artificial means than of explaining the causes of the natural phenomena which occur as they have in times past, or may occur in the future.

J. H. WHEELER,
Chief Executive Viticultural Officer.

VITICULTURE IN THE SOUTH OF FRANCE.

REPORT OF A. HERISSON, INSPECTOR OF AGRICULTURE; BEING A TREATISE
ON THE PRESENT AND MOST APPROVED METHODS OF COMBATING THE
PHYLLOXERA AND THE COMMON FUNGOID DISEASES OF THE VINE.

Translated from the French by J. H. WHEELER, and forming

Appendix 5 to the Annual Report of the Chief Executive Viticultural Officer
FOR THE YEAR 1887.

NOTE.—The following document I have deemed advisable to translate as bearing on the warfare against vineyard enemies already begun in California. Our vineyardists have already commenced to discriminate between the stocks mentioned in the last of this report, as to their value for different soils, and not a few are doubting the value of resistants, generally because of the failure of certain varieties planted in inappropriate soils. These will be greatly set at rest by a study of the following, which, although the experience of a year ago, is equally valuable for the present. That part of the report relating to submerged vineyards will, I trust, prove of special interest and assurance to vineyardists belonging to the irrigated districts.

J. H. WHEELER,
Chief Executive Viticultural Officer of California.

The year 1885 terminated with the discovery of remedies for downy mildew (*peronospera*), which left the vineyardists full of hope. During the year 1886, the success of the remedies proposed has been fully established by experience. The region of the south, already punished severely by the phylloxera, has, however, been scarcely spared by the cryptograme. An abundant harvest was once predicted, but, unfortunately, rains fell which promptly removed this illusion. Certain vines grafted on American stocks proved weaker than has ever before been remarked.

The distinction which I established between the different means employed for combating the phylloxera, in my report of last year, remains unaltered this year. Throughout the country it is proclaimed that the submerged vineyards have furnished such good wine this year, that they may be considered quite as advantageous as plantations made in sand.

PLANTING IN SAND.

The planting of vines in sand continues popular, but these soils are becoming scarce and high priced. Some that are sold for planting are, after a few years, found useless. For instance, each year some vineyards, planted in sea sand, and arriving at a certain age, are observed to weaken suddenly, and finish by dying. This is caused by the roots, which, after passing through the sandy soil, penetrate a salty subsoil, or one soaked with the salt water, and perish. Care must therefore be observed where this resort is had, to avoid low or salty places. The varieties commonly planted in sand are heavy producers; *e. g.*, Aramon, Petit Bouchet, and

Carignane. The produce of these vineyards during the past season has averaged about seven hundred and twenty gallons of wine, or five tons of grapes, per acre. At the harvest, this wine is sold at about 21 cents per gallon. The selling price of these full bearing vineyards planted in sand is at the rate of \$500 to \$600 per acre.

Submerged vineyards have this year given magnificent results. For example, the vineyard of Grand Crabouls, near Narbournne, belonging to M. Gautier, have produced from one hundred and five acres, one hundred and ninety-two thousand five hundred gallons of wine, or about thirteen tons per acre. Of these there are fifteen acres planted to Petit Bouchet, which have yielded fifteen tons per acre. The wine was sold at 25 cents per gallon, thus yielding over \$500 per acre; placing the cost of working and flooding at \$80 per acre, a net return of \$420 is had. From this showing comes a ready explanation of the great interest created in the South for irrigating canals. It also confirms the good judgment of the Government in undertaking to construct new canals in l'Ande. It is to be regretted that other districts favorably situated for canals should not have been able to avail themselves of the same remedy before. When the work of canal making is done by the Government, no extra expense is necessary in advance by the vineyardists, who, in the beginning, have expense enough; but who, when once the plantation becomes productive, is ready and willing enough to pay for the use of the water a liberal percentage of the returns he realizes (in this case amounting to fifteen per cent of his profits). This percentage yields to the Government a valuable income, after the expense of construction has been all made good.

SUBMERGED VINEYARDS.

Submersion is alike valuable for American vines as for non-resistant European varieties. The Lenoir has acquired a most extraordinary vegetation when flooded, and has produced as much as ten tons per acre, owing probably to the roots being thereby completely freed from the phylloxera and its damaging effects.

Some submerged vineyards planted in loose permeable soil have suffered invasion from the phylloxera, and summer-watering has been resorted to, to dissipate the evil. The latter proceeding has furnished excellent results, and cannot be too highly recommended in a general manner; in addition to relief from the phylloxera the vigor and fructification of the vine is greatly augmented. Certain proprietors make a supplementary submersion in April and in May, at the time when spring frosts are expected and feared, the process preserving them perfectly from loss.

Few failures are known where submersion has been practiced; still it is best to rely on this remedy for phylloxera only on soils but little permeable. When passing quickly through the soil and off, air enough is admitted to prevent perfect asphyxiation of the phylloxera.

Vineyards planted in view of submersion are usually devoted to heavy producing varieties, namely, the Aramon, Petit Bouschet, and Carignane. The production has this year attained an average of one thousand three hundred gallons per acre in well managed vineyards. The wine has been exceptionally good, selling at 21 cents per gallon. The value of vineyards arranged for submersion is placed at about \$800 per acre, varying somewhat with the location. The annual expense of submersion alone is from \$12 to \$16 per acre.

SULPHIDE TREATMENTS.

Treatment with the sulphide of carbon is held in the same esteem as in years past. It is employed principally in preserving old vineyards—no new plantations are made with a view to protecting them by means of this remedy. With it the vineyardist hopes only to maintain the production where the soil is sufficiently loose and deep. It, as in earths like those of the Vistre Plains, or those near Mimes, which appear to unite the conditions most favorable for the treatment with sulphide of carbon, and here it sometimes fails. In compact soils we can only hope to prolong for some years the existence of the vineyard. Treatments made with this remedy are now mostly applied by means of a plow constructed for the purpose. The sulpho-carbonate of potassium has lately been almost entirely abandoned in this region, and is followed by the employment of sulphide of carbon, dissolved in water, the results of which are said to be quite as good, and produced at much less cost. This solution is employed at the rate of one gramme of sulphide in winter, and a half a gramme in summer, to a quart of water. A mechanic in Aude, Mr. Fafeur, manufactures a simple and ingenious instrument, by means of which the solution may be prepared with great exactness and with all perfection desirable. It is quite essential for this treatment, that the mixture should be intimate and uniform, a result obtainable only by a special apparatus. The quantity of solution employed for each vine is eight or ten quarts. This method of treatment has developed to a great extent in l'Aude, where it is employed to defend all the vineyards newly attacked.

AMERICAN VINES.

American vines, which appeared triumphant over all methods in 1885, have, in 1886, entered on a critical period, one with which all viticulturists are occupied. Certain grafted vines, limited in number as yet, have given at the end of Spring manifest signs of decline. The characteristics of the evil have been nearly everywhere the same—want of vigor, frequently associated with chlorose of the foliage. These two manifestations are observed in all degrees, grading from vines merely attainted, to vines at the point of death. Generally, in the vineyards so afflicted, the vines are not all attacked in the same degree. There are zones and plots where the malady is more intense, and within the spots most afflicted some vines may often be observed which seem to resist this weakness. It is not more uniform than were the phylloxerated spots. If any resistant vines are found, which escaped the grafter, they usually contrast forcibly with the others in their beautiful vigor, setting off unpleasantly the imperfect vegetation of the grafted vine. Grafts of three and four years show most of the weakness. The failing is rarely noticed in the second year after grafting, and more rarely yet in the first year. American vines, not grafted, are uniform in showing luxuriant vegetation.

ENFEEBLEMENT OF VINES.

The above named trouble has been remarked heretofore; vineyardists attributing the enfeeblement to poor grafting, bad unions, or atmospheric accidents. This year, however, as a large area of grafted vines have arrived at the age of three and four years, the fact has become more noticeable. Further, the damage has been greatly intensified by certain meteorological phenomena, which latter cause has not been generally appreciated, but which has greatly held back the vegetation in the vineyards. It is quite

possible that the quick and sudden changes in temperature, which took place in the spring, is partly responsible for this condition of the grafted vines.

This enfeeblement of grafted vines, though noticed only in isolated cases, has considerably alarmed our vine growers—so much so, that the Riparias, in which it is most noticable, is less favored in the market now than resistant vines suitable for direct production; *e. g.*, rooted Riparias were last year sold at from \$16 to \$20 per thousand, whilst Lenoir roots brought only \$12 to \$14 per thousand. This year the Lenoir roots are worth \$16 to \$20 per thousand, and Riparias do not find buyers at \$14. This is one of the extreme cases of exaggerated public opinion not unfrequently noticed.

Many explanations have been offered for this failing of certain grafted vines. By some it is attributed to intemperate weather and to a want of warmth in the soil. This is not satisfactory, inasmuch as these plants remaining ungrafted show no signs of suffering. Some believe it to be due to the imperfect union formed with the scion. This is improbable, as indicated by the heavy growth and luxuriant foliage of grafts on Lenoir roots—growing perhaps on the same spot, and having been grafted by the same workmen who grafted the Riparias now showing the defect.

CAUSE OF THE FAILURE.

Finally, it has been asserted that the evil is directly attributable to the soil, but no rule is given directing us as to what soils to choose for these grafted vines.

It cannot be disputed that the nature of the soil has a predominating effect; but even this must be considered as varying with the variety of resistant vine chosen for the root.

I am of the opinion that the sole cause of failure is the improper choice of the root for the particular soil planted—an error in the matter of adaptation. If such is the case, how may we explain the fact that the ungrafted plants are vigorous, when the grafts suffer? Why is it thus? Simply because the graft renders the root more delicate and susceptible to unfavorable conditions, which might not otherwise affect the plant. We are assisted to this conclusion by former experiences in grafting on European vines, for it was only on those grafts so conducted as to prevent the rooting of the scion, that we have found similar results.

It becomes necessary to attribute our want of success in the above mentioned grafts, to an error in the choice of the soil which naturally repels the culture of a grafted vine, or to an error in the choice of the variety adopted for that soil.

The same errors have been committed in the planting of direct producing resistants in a less degree, but, in some cases, there have been marked failures. The attention of our vineyardists becomes, therefore, at present concentrated in the choice of soil and the variety, and it is well that such is the case.

DIFFERENCE OF SOILS.

Many have drawn unwise conclusions from having visited vineyards planted to American vines reputable for their perfect growth; they have there seen direct producing resistants of superb appearance; they have found them filled with fruit, and have hastened to transport similar plants to their own soils confident of similar success, the whole resulting in failure. Thus, for instance, the proprietors owning land of an entirely different character, wanting perhaps in depth and strength, have proceeded to

plant *Riparias*, and grafted Lenoir vines, which they found with full vegetation in rich granitic or alluvium soils. They have failed to note the wide difference between their own soils and those accepted as examples, hence proceeds their failure. American vines are at present cultivated to such an extent that any vineyardist desirous of establishing a resistant vineyard may find in his district a soil similar to his own planted to American vines. This being the case, he may accept with perfect security the results obtained in these others' experiences.

To determine if his soil is of the same nature it is not necessary to procure a chemical analysis. He may consult the geological card and find a geological formation, accompanied by similar climatic conditions to his own. Plantations in these soils will furnish abundant examples for him. Such I believe to be the only rational method of securing success.

The study of varieties belonging to the different geological formations is not yet complete, to be sure, but when such is the case the whole problem will have been solved. One fact is certain, however, namely, that there are few formations in which the cultivation of American vines may not be advantageously employed. In nearly all cases one or more varieties will be found sure of success, and there is scarcely a place where the plantation of American vines should not be tried, even though the soil be of little depth, or possessing a subsoil impenetrable to the roots. American vines require, above all things, a soil which will permit a large development of the roots. For this reason the holes for planting should be not less than sixteen inches in depth, a proceeding indispensable to their proper planting.

FAVORED VARIETIES.

The American vines most in favor in this region at present are: for grafting, the Lenoir, the *Riparia*, the *Rupestris*, the *Solonis*, and the Taylor; for direct producers, the Lenoir, the *Othello*, and the *Herbemont*.

The *Riparia* has been unjustly neglected this season; but in rich, deep, alluvial soil it furnishes grafts of superior fruiting power; and, too, in varieties that do not attain the same production on any other stock. The *Rupestris*, in gravelly soils, and the *Solonis*, in new ground, have produced excellent grafts, and are receiving more attention; they now rank nearly up with the *Riparia*. The Taylor is one which has proved valuable only in very clayey soils, and for this reason it has been for some time quite neglected.

The Lenoir is the favorite of the present day, and is entitled to a high position, partly on account of its value as a direct producer, and partly for its superior value for grafting. As a direct producer it is far from comparable to European varieties. It roots with great difficulty from the cuttings; and produces, in soils of medium fertility, not more than two tons, or a little over, per acre. The wine presents serious difficulty in fermenting, and, as ordinarily prepared, furnishes, in most cases, but little body. It possesses a violet color, poorly esteemed in commerce, and is subject to frequent troublesome ferments. To make a good wine of the Lenoir it becomes necessary to add at least eight grammes of tartaric acid to each gallon of the juice, and to allow it to ferment on the pomace not more than two or three days. Some color and alcohol is lost by this means, but, as it ripens moderately early, the pomace will be valuable for mixing with other varieties, which will thereby become improved in both color and strength.

The *Othello* is now much in vogue, the cuttings having last year sold for \$16 per thousand, and are this year held at double this rate. It possesses

valuable qualities, in that it roots easily from the cutting and arrives at fruiting early, and produces more than the Lenoir by half at least.

The Herbemont is not agreeable to the hot, dry plains of the region. In the mountainous parts it produces a wine highly esteemed, and in production it is comparable to the Lenoir.

All direct-producing American vines here cultivated are greatly inferior in quality to the indigenous varieties, and are less prolific. There is now, therefore, great interest attached to the study of hybrids of European with American resitants. Of the numerous hybrids thus far produced in the laboratories and nurseries, there are none which yet justify planting on an extensive scale. Among direct producers already tried has been found one grown from the seed of the Lenoir; namely, the Saint Sauveur. It appears to justify the high hopes already ventured for it.

To summarize, the viticultural situation in the south is considered good. The work of reconstitution and defense in the vineyards has not ceased to progress. Planting in sand and submersion give admirable results. Treatment with sulphides is becoming each day more perfected. Plantings of American vines take each year increased possession of the soil, and will cease to present any examples of failure when the growers make judicious selection of their soils and of varieties adapted by an understanding of results obtained heretofore on the different geological formations.

A. HÉRISSON,

Inspector of Agricultural Instruction, charged with the functions of Inspector of Agriculture.

RESEARCHES ON THE ELECTRIFICATION OF WINE,

By FLAVIO MENGARINE, Rome, 1887 (translated from the Italian, by Messrs. Tojetti and Cevasco, and approved by Father Neri), being

Appendix 6 to the Annual Report of the Chief Executive Viticultural Officer
FOR THE YEAR 1887.

In February, 1885, at the Physical Institute of the University of Rome I commenced experiments on the rapid growing old of wine by means of electricity. It interested me to understand more of the chemical actions of an electric current on wine in general, already noted and announced in the works of Professor Blaserna (1), Caspeni (2), and others, the different effects that a current of constant intensity would have produced applied to the same sample of wine during different periods of time, and especially to know the different grades of oxydation, what would be the subordinate results of the conservability that the wine would have acquired.

The experiments were conducted in this way: In a small vat of the capacity of ten litres, or thereabouts, I immersed two plates of platina, sixty-six millimetres in length, twenty-five inches in width, and thirty-five millimetres apart, that communicated with a pile of six Bunsen batteries, large model, mounted in tension. I introduced in the same circuit a compass that was graded in amperes, destined to measure the current furnished.

Before commencing the experiment I preserved a part in a bottle (laboratory bottle of Erlenmeyer) closed with a cork, a sample of the liquid that was to undergo the test. It was a common white wine of the firm Ostini di Gengano, still rich with fermenting matter, and in a fair way of maturation. I caused the current to act, and measured the intensity by means of an electrometer; extracted after thirty hours a sample, which I preserved in the same manner as the other. I renewed the plates, and continued the action of the current for six hours, extracted another sample. After another six hours, a third, and so on successively, observing the current furnished and the number of hours it continued to act. Extracted fifteen other samples; the last had received the current for one hundred and thirty hours, which I preserved as the others preceding. The residue of about three and one half liters I gathered in a jar, closed with a cork, and hermetically sealed with paraffine.

I removed the plates from the wine and, when the action of the current was stopped, found them to be covered with an albuminoid substance, almost black and in an advanced state of oxydation. The wine appeared musty, and had acquired a perfume, that from the samples less electrified it appeared sensibly increasing as to become exaggerated and dissimilar to that of old wines, in the samples longer electrified.

Previous to these first observations the samples gathered as aforesaid, in bottles lightly corked, with the exception of the latter, which was sealed, were placed in a room of the Physical Institute, which was at a constant temperature of 15° Centigrade, together with the sample of wine that was not electrified, that should have demonstrated its degree of conservability

in comparison with the others that had received different quantities of the current.

After a sojourn of a year, with the conditions above described, I retook all the samples, held a microscopic examination, and then placed them under a chemical analysis, leaving the residue for an organolitic examination.

The results of the analysis and observations performed, being comparative, can better be learned from the following table. In it with the letter (A) I designate the characteristics of a sample taken from the original barrel a year before the wine to undergo the experiments was extracted. With the letter (B) the sample not exposed to the electricity, but preserved in the same condition as the others. With No. 1, I marked the first sample that had received thirty hours of current at the rate of 3.99 amperes per hour.

I must note here that the current furnished being in rate of 0.133 amperes, the coulomb of electricity received by sample No. 1, would be 14.364, but I prefer to explain, for the simplicity of the phrase, this number in ampere hours.

The second column shows the number of hours the wine was exposed to the current. The third column contains the number of ampere hours received by each wine. The fourth column shows the results of the microscopic examinations. The fifth, the results of the chemical determinations of the alcohol, total acidity, and extraction substances, showing the differences between the electrified sample and the natural wine.

The two last columns report the organolitic characteristics and special observations.

(1.) On the way of enaging wine by means of electric current, extracted from the annals of Sicilian Agriculture. No. 14, August 1, 1870.

(2.) Practical theory of enologia. Torino E. Loescher, 1882. Vol. 1, page 124.

ANALYTICAL TABLE.

No. of the Sample	No. of Hours the Wine was subject to the current	Quantity of the Electric Current, in Amperes-hour	Microscopic Observations.
A	0	0	..... Saccharomycies of the alcoholic fermentation, the <i>ellipsoidens</i> prevailing, the most being dead; a few living, with but little activity.
B	0	0	..... Alcoholic inactive ferments, very active and intense, vegetation of <i>bacterium aceti</i> . The sediment on the bottom of the sample very rich of filamentous matter; incipient putrefaction.
1	30	3.99	..... Plenty of pulverulent sediment composed of <i>ellipsoidens</i> on the surface and in the body of the liquid; <i>bacterium aceti</i> in great quantity.
2	36	4.79	..... On the surface: <i>saccharomyces ellipsoidens</i> , filaments and <i>bacterium aceti</i> . On the bottom, very little <i>bacterium aceti</i> , <i>saccharomyces ellipsoidens</i> , filaments in less quantity than on the surface.
3	42	5.58	..... Rich of sediment on the bottom, poor on the surface; the same fungi as the preceding, but less vegetation of filaments.
4	48	6.38	..... Like the preceding; on the bottom, inactive <i>saccharomyces mycoderma</i> entirely wrapped in a bacteriacean form; very small and granular.
5	54	7.18	..... <i>Saccharomyces ellipsoidens</i> and very <i>mycoderma</i> ; <i>bacterium aceti</i> ; on the bottom, granular form like the preceding.
6	60	7.98	..... Floating fatty substance; <i>saccharomyces ellipsoidens</i> ; the <i>mycoderma</i> in more proportion than in the other samples; granular form and <i>bacterium aceti</i> .
7	66	8.78	..... The granular substance wrapping on the surface and on the bottom the <i>saccharomyces mycoderma</i> and the <i>ellipsoidens</i> ; not much <i>bacterium aceti</i> , in proportion of the other samples.
8	73	9.71	..... Like the preceding; presence of <i>bacillum</i> on the bottom.
9	79	10.51	..... Like the preceding; the <i>sac. mycoderma vini</i> increases on the <i>sac. ellipsoidens</i> , and the acidity diminishes.
10	85	11.30	..... Like the preceding.
11	92	12.24	..... On the surface, <i>saccharomyces mycoderma</i> , in large quantity; on the bottom, not much <i>bacterium aceti</i> and granulation.
12	98	13.04	..... Like the preceding, circular forms, very likely of <i>saccharomyces ellipsoidens</i> decomposing.
13	104	13.83	..... On the bottom, granulation in large quantity; on the surface a good deal of <i>saccharomyces mycoderma</i> ; the <i>bacterium aceti</i> scarce.
14	111	14.76	..... Like the preceding, circular forms; no <i>bacterium aceti</i> .
15	118	15.89	..... A good deal of sediment, like the preceding.
16	124	16.49	..... On the surface, only the <i>saccharomyces mycoderma</i> ; abundant granulation; no <i>bacterium aceti</i> .
17	130	17.29	..... On the bottom, large and narrow stripes of organic substance, not organized, and consequently not being fungi matter; no <i>bacterium aceti</i> ; on the surface a few <i>saccharomyces mycoderma</i> .
18	130	17.29	..... Many alcoholic <i>saccharomyces</i> ; very few <i>saccharomyces mycoderma</i> ; granulation; no <i>bacterium aceti</i> .

CHEMICAL ANALYSIS.					ORGANOLEPTIC ANALYSIS.	OBSERVATIONS.
Alcohol, per cent	Total Acidity, per cent (less the CO ₂)	Acetic Acid, per cent	Extractive Substances, per cent	Difference of the Dry Extract on the Type Wine		
10.3	6.9	-----	25.30	-----	When not much decolorized, very young, still in low fermentation, without any conspicuous perfume.	Analysed at the moment of the experiment, not electrified. Wine type of comparison taken from the original barrel.
10.3	6.9	-----	25.30	-----	The wine has passed entirely through the acetic fermentation, and begins to putrify.	Sample of comparison not electrified, maintained in the same conditions of time and temperature as the electrified samples.
6.7	13.17	6.27	16.3	9.0	Limpid and perfumed; acetified.	It presents an abundant sediment on the bottom and on the neck of the bottle.
6.50	20.1	13.2	16.8	8.5	More colored than the preceding; a little bitter, besides the acidity.	Like the preceding.
5.45	19.9	13.0	16.1	8.5	Decolorized and perfumed, still much acetified.	Like the preceding.
4.95	22.7	15.8	23.7	1.6	Faded, sharply acetified, free taste, very decolorized.	Like the preceding.
4.57	10.7	3.8	16.4	8.9	Uncomplete acetification, perfumed very limpid, and decolorized.	The bottom compact, gelatinous, adhering to the glass.
4.40	22.50	15.6	14.7	10.6	Sharply acetified, not much decolorized.	Abundant and compact sediment.
4.29	17.60	10.7	14.8	10.5	More colored and less limpid than No. 4; acetified, coarse, and complex taste.	Abundant and compact sediment.
4.30	17.55	10.65	14.9	10.4	Acetified and weak.	Abundant and compact sediment.
4.25	10.10	3.20	14.6	10.7	Very decolorized in comparison with the preceding.	Abundant and compact sediment.
4.25	9.3	2.4	14.0	11.30	More decolorized than the preceding, faded, lightly acetified, bitterish.	Abundant and compact sediment.
6.5	8.25	1.35	15.9	9.4	Faded, decolorized, the acidity not much perceptible.	Abundant and compact sediment.
3.9	7.2	0.3	16.0	9.3	Not much decolorized much faded, no acidity, bitterish.	Abundant and compact sediment.
4.0	7.15	0.25	16.9	9.4	Very decolorized and perfumed.	Abundant and compact sediment.
3.5	7.00	0.1	17.7	7.6	Very decolorized and perfumed.	Abundant and compact sediment.
3.75	7.10	0.2	18.1	7.2	Very decolorized and perfumed.	Abundant and compact sediment.
3.10	6.85	*0.05	16.5	8.8	Good, perfectly sound, no sign of acetification.	Abundant and compact sediment.
8.65	6.54	0.36	16.5	8.8	Good, perfectly sound, no sign of acetification.	Bottle with emery-polished stopper.
8.9	6.17	0.73	16.4	8.9	Very good, limpid, and greatly decolorized, better than the sample type.	Residue of the experiment: volume like 3.50 in bottle closed with a cork and paraffine.

* Total loss of acidity on the wine type.

It remaining now to try the conclusions, both from the analytical table and from the general proceedings of the experiments, summing up the different phases.

The electric current introduced in the wine produces in it a rapid turbidness, followed by the precipitation on the bottom of the vessel, of all the organic substances that it has in suspension, and of a portion of the albuminoid substance naturally contained in the wine. A very small part of this sediment coats the two plates of platinum, and being there in contact with the oxygen that is developed by the current, is darkened and entirely burned, adhering to the plates in such a manner as to prevent any further precipitation. The more or less duration of the current seems not to have any influence on the quantity of the extractive substance which is precipitated, since the results of the analysis show a perceptible constant loss in all the samples, with the exception of Number 4, which has only lost 1.6 per thousand. It is not surprising if the diminution of the extract is generally so considerable, because we must take into consideration the small quantity of wine subject to the electrization in comparison with the energy of the current received by it, and the size of the plates of platinum used. Besides the wine still very young has a very high degree of density, because of the azotic substances and the organism that it contained in suspension; the rapid precipitation of these substances immediately after the action of the electric current, and their presence instead in the sample not electrified, which was separately analyzed, has produced the marked difference in the results of the analysis.

Evidently, repeating the experiment on a larger quantity of wine which has been already a little reduced, even using platinum plates of the dimension suggested by Professor Blaserna as more adapted for the electrification of large quantities—that is of six and eight centimeters in width, by thirty or forty in length, the loss of dry extract must be very small, and at any rate such as not to exceed in a perceptible manner that which takes place during the natural aging of the wine.

The results obtained on the coloring matter have not been sufficiently precise as to permit to draw a conclusion. In the most of samples there was some weakness of color, and it would seem that it even increases with the increasing of the electric action; then there was not only interruption in this gradual decoloration, but in the samples 4, 5, 6, and 7, the coloring intensity increased in comparison with numbers 2 and 3, which were fairly decolorated, so that the sample 8 became nearly uncolored, and approaching the yellow color of a very old wine.

There is no doubt, as it has been well demonstrated, that the precipitation of color takes place under the action of the current, but new experiments are needed, especially on red wines, to determine with better precision how and in what proportion it takes place; which causes can thwart it, and to what limits it can be brought; because it could happen that to obtain a rapid aging, it would become necessary to use such a quantity of current as to deteriorate the coloring matter, or to cause a too large precipitation that would damage the wine, by depriving it of one of its qualities most appreciated by the trade.

The difference in the alcoholic degree between the wine type and the first sample, which is the less electrified, is of about 3.6 per hundred, and increases with regular progression in such a manner that in the sixteenth sample it reaches the double of the first difference, that is, 7.2 per hundred.

It seems evident that these two losses are due, the first to the formation of the acetic acid and to the fading of the alcohol during the period of one year, because of the samples remaining in contact with the air being lightly

corked; the ground to the production of *saccharomyces mycoderma vini*, and for a small portion to the evaporation of the alcohol being carried away by the little bubbles of gas developed by the electrolysis of the air. This latter loss increases with the increasing of the current in a sufficiently regular manner, and comparing the results of the analysis, we find that it has an average value of about 15 hundredths per cent for every six hours of current.

From this amount may be deducted approximately what represents the loss of alcohol by elimination during the electrolysis. The sample number 18, which being more electrified than all others, of larger volume and hermetically closed, has remained free from acidity and slow evaporation, has given to the analysis 8.9 per cent of alcohol, that is a total diminution of 1.4 per cent on the sample type; this diminution, supposing it has taken place during the electric action, would correspond to about 0.07 for each six hours of current, and then the loss due only to the *saccharomyces mycoderma* should be of 8 hundredths per cent, without taking into consideration the difference occasioned by the gradual diminution of the acetic acid.

These results have a quite theoretical value; because, if the current is applied to large quantities, preserved with care, the loss of alcohol would be very small, and commercially of no importance.

More important is the formation of the acetic acid in relation to the duration of the electrification, because it affords a new criterion on the antiseptic power exercised by an electric current on the wine, and also, generally, on any fermented or fermenting matter.

In order to determine this action as carefully as possible, a wine was selected in the best condition to produce secondary alterations and fermentations, that is, a wine still rich of ferments and of azotic matters. In fact, the sample which was not electrified was soon changed into vinegar, and afterwards all the mass becoming putrefied.

On the contrary, there was no putrefaction in the electrified samples, notwithstanding the albugineous precipitation, which has produced a commencement of decomposition not accompanied by any formation of ammonia, ether, etc., as generally is the case. The very small granular form perceptible in the sample No. 4, probably is only the product of this maceration, rather than decomposition, through which has passed the azotic substance by remaining, during one year, in contact with the wine. This opinion agrees with that of Professor Pirota, of the Botanical Institute of Rome, and is applied also to the circular forms observed in the sample of No. 12 and others.

The formation of the acetic acid stands in inverse ratio of the duration of the current, whilst the production of the *saccharomyces mycoderma* takes place in direct ratio. This can be attributed to the difficulty met by the two ferments in order to develop themselves at the same time, and to the superficial vegetation of the *saccharomyces mycoderma*, which its biological condition is less affected by the antiseptic diffused in the surrounding air. On the contrary, in the mass of the liquid all the alcoholic ferments are precipitated as soon as they become inactive, and the *bacterium aceti*, which alone is found living, must submit by degrees to the *saccharomyces mycoderma vini*, because of being directly exposed to the action of electricity.

In the sample No. 14, which has received one hundred and eleven hours, 14.76 ampere-hour, and in the following, there is not in the microscopic observation any *bacterium aceti*, although in the result of the chemical analysis there is, in Nos. 14 and 15, a light exuberance of acidity on that of the wine type, which may be considered as acetic acid. To still

better determine until what limits these latter samples would remain free from acidity and other diseases, I left the Nos. 14, 15, and 16 at the open air, without closing them, during all the summer and fall. After this time I examined them with the microscope, and found them turbid from dust, ferments, etc.; but none of them in a state of putrefaction, and only one, the No. 14, beginning to become acid.

The importance of these results ought not to pass unheeded, obtained, as they were, by simple and harmless means; and it is not improbable that they may find some useful application, even outside of the analogical field. If, in so unfavorable conditions, it was possible to make sterile the wine to such an extent, it is but natural to believe that by applying the electricity to large quantities, a sterility of the wine, nearly absolute, could be obtained. But it is necessary to make experiments on a larger scale, in order to learn approximately what quantity of current is required to make sterile certain known quantities of wine, with due proportion to the precipitation of the coloring matter, and to the perfume that is formed. For the present we may hold that a moderate application of current develops an aroma suitable to the wine; but if it is lengthened too much it produces a too pronounced scent, in which is also perceptible that of ozone, by which its value is determined, while the wine acquires preservative qualities that increase in direct ratio of the duration of the electrification.

The principle which has prevailed until now, that the electric current applied to the wine imparts to it the character it acquires by aging is, in conclusion, a little displaced. We must take into consideration an antiseptic action of great energy, which, perhaps, can be more useful to the wine than the rapid aging which is produced from the same cause. It remains to study in what manner and measure these effects are compatible one to the other, both in the scientific and the analogical and industrial interest.

HERBACEOUS GRAFTING.*

PRELIMINARY INSTRUCTIONS FOR EXPERIMENTAL WORK,

Issued by the Chief Executive Viticultural Officer to the Inspectors of the Viticultural Commission, June, 1887.

Herbaceous grafting, as applied to the vine, consists in grafting on the growing wood in midsummer. It is a method which has been known for fifty years past in Central and Eastern Europe, and has recently become common in the region of Hungary. So valuable has the method here described been found, that during the past year, Von Hermann Goethe, Director of the Royal School of Viticulture at Marburg, has issued a work largely devoted to the subject. Other and more common systems are treated by Professor Goethe, but preference is given to the above named method in that it has opened a new and short way to the establishment of resistant vineyards as well as affording improved facilities for changing objectionable varieties to others of better quality.

The many novel methods of grafting the vine which have been proposed of late years, and their common failure in practice, have led me to believe that such announcements as that of our esteemed contemporary, Hermann Goethe, must undergo a certain practical test in the vineyards of this State before being generally accepted as fully adapted to our climate.

Before, therefore, proceeding to announce to our vine growers the value of herbaceous grafting, I have thought proper to ask our inspectors and others working with us, to this year make a test of the method described in the following—so far, at least, as the lateness of the season may permit—and transmit to this Board the results of their experiments, that another season may find us able to adopt or discard the system altogether.

The many advantages obtained from its use, if successful, will become evident to our vine growers as they proceed; advantages which, if the method prove successful in California, our vineyardists cannot afford to be long without.

Believing that the method must depend to a large extent on the care and accuracy with which such delicate work is executed, I have illustrated fully the operation in Figures I, II, and III; these, if followed closely with a careful study of the following text, will, according to our friend Hermann Goethe, lead to success.

The period chosen for performing the operations is of the greatest importance. The most propitious epoch found in Hungary ends about the middle of July. As our vines put forth earlier and are now further advanced, it may be plainly seen that there is no time to lose. The information here reproduced came to me so late that instructions could not be issued sooner. In consideration of this fact it is to be hoped that the experiments will be performed immediately and that our experimenters may be particularly careful to use only delicate and rapidly growing shoots for both scion and subject. (The term "subject" is applied to the cane into which the scion is inserted.)

* For results of these instructions, see report of Chief Executive Officer.

Experiments in this work have already been begun by me with fair indications of success, but it is still too early to judge their value.

TO OPERATE,

Choose that period in the growth of the vine when the shoots show daily advancement, selecting the most vigorous canes for the purpose. The union should be made at a point on the green shoot, so near to the growing end as to exhibit no white pith when cut. In fact, that part of the cane in which the pith is scarcely distinguishable from the wood and bark is the surest to unite with the scion. It must, however, be strong enough when wound to maintain the scion well in position.

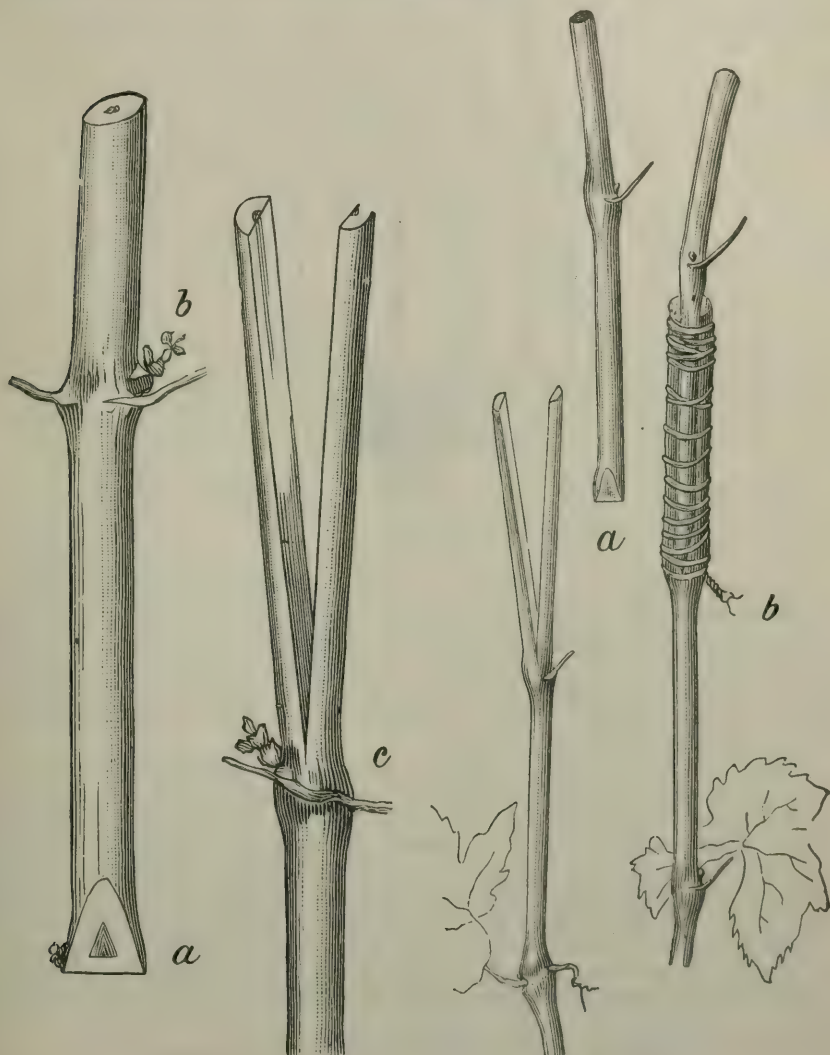


Figure I.

Figure II.

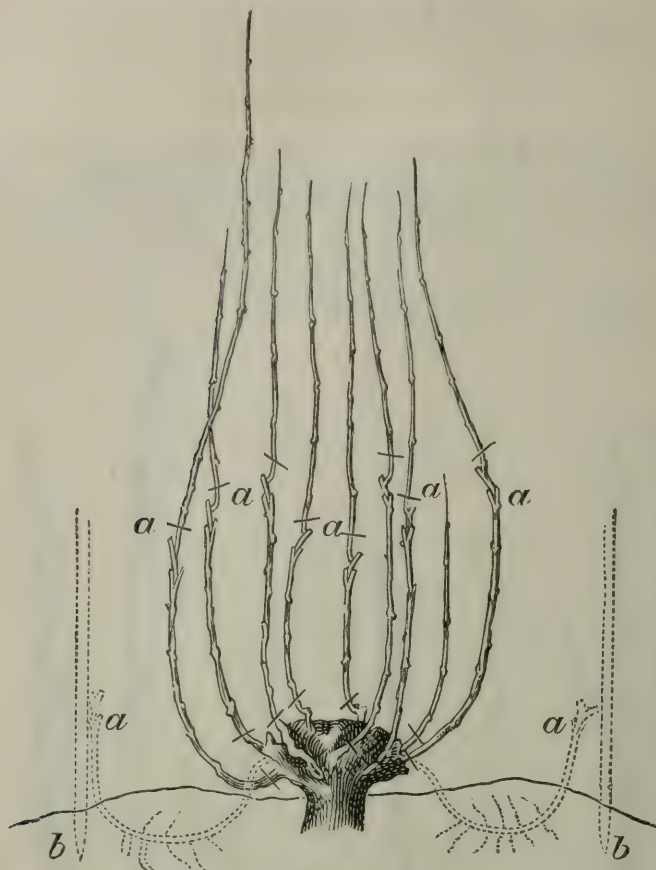


Figure III.

Figure II exhibits the graft when complete—natural size. Figure I shows the parts enlarged. The last of June has been generally selected for the work, although some work performed the first of July has shown a loss of only two per cent. When late spring frosts prevail a later period is chosen, as the rapid growth then comes later. This graft cannot be made to succeed on canes attaining a woody appearance, but both scion and subject must be elastic and yet not too soft.

The bud on the scion at *b*, Figure I, must be examined and found good, and in selecting the scion it is generally safe to choose that bud at the base of the first well-opened leaf found on the growing cane. Lower and more woody scions will not answer. Laterals which show slow growth will not answer for the subject, but may be selected if still growing vigorously. The original canes proceeding direct from old spurs are most commonly selected for the subjects, particularly those which show a bright sappy appearance.

Warm growing weather favors much herbaceous grafting. A cold wind is harmful in checking growth, likewise a dry hot wind, and it is well, in hot weather, to suspend operations during a few hours in the middle of the day.

Do not graft vines showing a sickly appearance.

The preparation of the scion is clearly shown in the cuts, only be careful to preserve the scions fresh. If necessary to keep them some time, place them in water, thoroughly shaking off the water at time of grafting. Let the cut of the lower end of the scion (*a*, Figure I) be made through the bud that the point of the wedge may possess the enlargement necessary to fit the base of the cut in the subject as shown at *c*. The knife in entering the subject should split it just through the middle and descend half way through the center of the enlarged part *c*, Figure I. Let the size of the scion be near that of the subject, never larger. The leaf joining the bud of the scion at *b*, Figure I, should be cut off, leaving the stem as shown in the cut.

In inserting the scion see that the bark of the two parts come smoothly together at the point and that the tender bark is not broken or slipped. A safe precaution is to spread apart the subject when pushing home the scion.

To tie the graft, use a cotton string; begin to wind at the top and, by drawing it close and tight at the bottom near the bud, you will prevent the scions being forced from place.

This done, six or eight days will determine the measure of your success. By this time the scion bud should have begun to grow, following which all suckers and laterals drawing from the cane on which the graft is placed should be carefully removed, and this latter operation repeated as often as may be required to force all growth to the new part.

The success of the graft is early indicated by the falling off of the leaf stem which was allowed to remain on the scion. As the union grows the string must be loosened. The short time necessary to determine the success of this method gives ample opportunity to repeat the operation several times during the season, if success does not attend the first efforts.

Grafts made on growing canes of riparia vines two years old have shown good results, though older vines are equally good. Figure III shows an old riparia vine grafted on its growing parts at *a*, thus producing resistant grafted cuttings well united above to a better variety, which may be planted in the new vineyard the following spring or layered and rooted as shown by the dotted line.

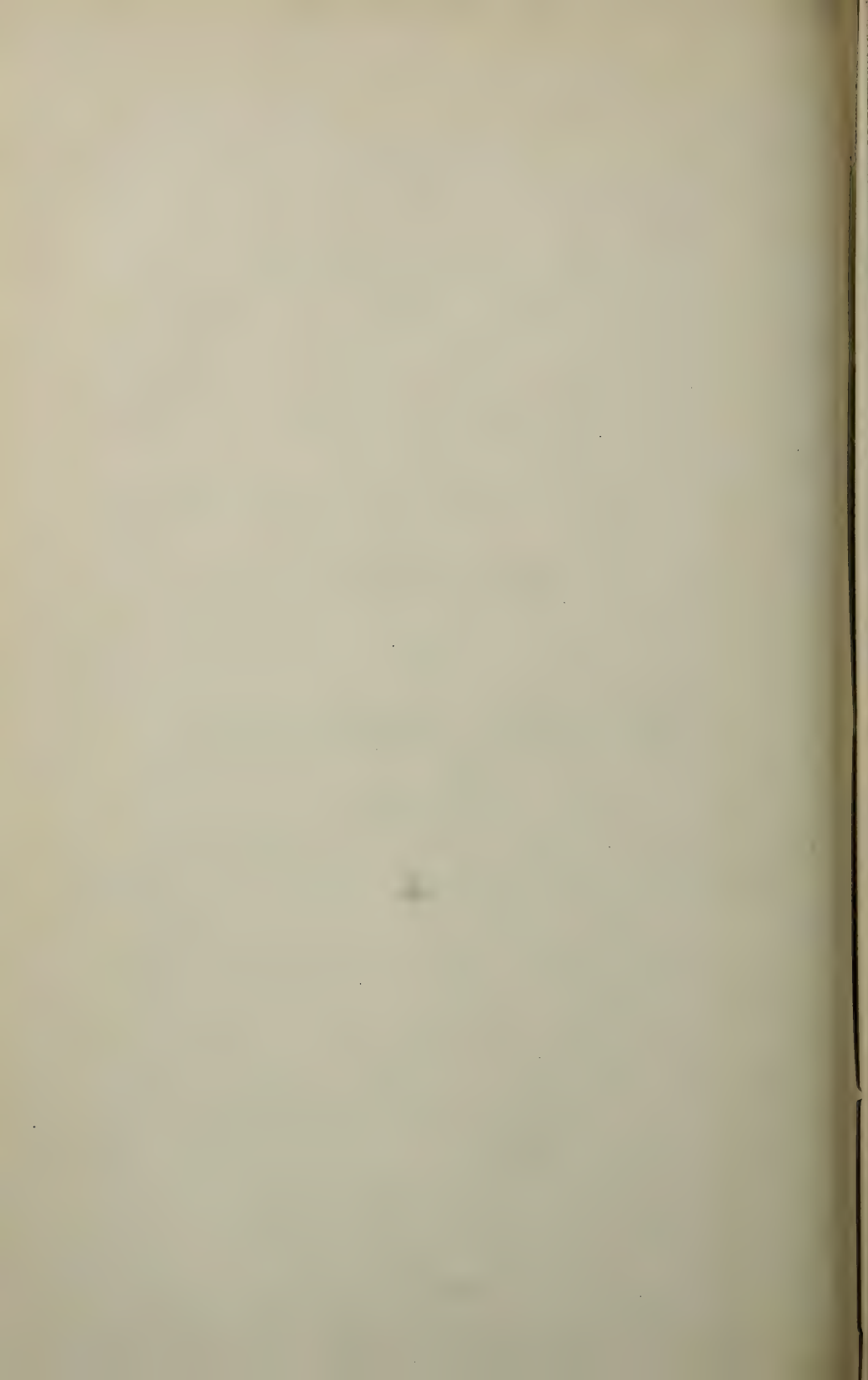
Many other advantages growing out of this method will be explained later if we can determine the success promised by Professor Goethe. In the meantime we call upon you to experiment carefully and forward your results as early as possible.

Very respectfully,

JOHN H. WHEELER.
Chief Executive Viticalural Officer.



REPORT
OF THE
STATE ANALYST
FOR 1887.



REPORT OF THE STATE ANALYST FOR 1887.

OFFICE OF STATE ANALYST, }
BERKELEY, CAL., April 1, 1888. }

To the State Board of Viticultural Commissioners :

GENTLEMEN: During the year ending April 1, 1888, there were sent to the office one hundred and seventy-eight samples to be tested for adulterations. They may be classified as follows:

Wines.....	149
Wines (for arsenic only).....	4
Grapes (for arsenic only).....	4
Wines (for zinc only).....	2
Grapes (for zinc only).....	2
Tannin (for boracic acid only).....	1
Cream of tartar (for boracic acid only).....	1
Sal soda (for boracic acid only).....	1
Wine preservatives.....	4
Clarifiers, etc.....	10
Total.....	178

In none of the one hundred and forty-nine samples of wine were found any excess of sulphate of potash over two grains per litre (the maximum allowed by the French Government), which shows that the plastering, where practiced, has not been excessive; and in none were found any salicylic acid, excess of sulphites, or artificial coloring matters. In two were found considerable quantities of boracic acid, which had evidently been added with a view to preserve the wine.

Out of eighty-five samples, which were tested with a view to discover minute traces of this acid, thirty-four were found to contain traces of it. Finding so many samples containing traces of boracic acid (which has never heretofore been cited as a natural constituent of pure wine), we were led to suspect that in California it was a natural constituent of some wines, at least. With a view to confirming or proving the foundation for this suspicion, we began to look more carefully for traces of boracic acid. As a result, out of twenty-two consecutive samples of wine, some of which were positively known to be pure, every one, without exception, were found to contain traces of the acid. And in another series of twenty-one consecutive samples, which were examined for traces of boracic acid by an entirely different method, not one failed to give a distinct test for that substance. Since some of these wines were *known to be pure*, and gave distinct reactions by *both* methods, the conclusions seem almost inevitable, that some at least of our pure California wines contain, as a natural constituent, traces of boracic acid.

The samples of grapes tested for arsenic and zinc were from vines that had been treated, last June, with the following solutions:

- A.—1 ounce Paris green to 1 gallon water.
- B.—1 ounce Paris green to 2 gallons water.
- C.—1 ounce arsenic to 5 gallons water.
- D.—1 ounce arsenic to 10 gallons water.
- E.—1 ounce acetate of zinc to 2 gallons water.
- F.—1 ounce acetate of zinc to 4 gallons water.

Arsenic was found in each of the first four samples; the greatest amount being found in "D," in which was found .00005 grammes of metallic arsenic in 382 grammes of the grapes. The others contained even considerably less than this. No zinc was found in either "E" or "F." The wines tested for the same toxicants were made from the grapes of which the above were samples. Neither arsenic nor zinc were found in any of these.

Of the wine preservatives examined, two of them would have introduced sulphurous acid into the wine (both being bisulphites), and the other two contained large quantities of boracic acid. Of the "clarifiers" examined, none were considered harmful.

It is almost impossible, at present, to assert the presence of an excess of glycerine (unless extreme), owing to the fact that there has not been, as yet, any reliable standard established for California wines; and, until such a standard is established, it will be impossible to say just what amount shall constitute an "excess." There has been found such a difference between the normal quantity of glycerine existing in German wines and that found to exist in the wines of France, that it would be hazardous to infer the normal quantity of that substance existing in pure California wines, from either of those two standards. The same may be said in regard to the detection of "watered" wines, where the "watering" has been done in a scientific manner.

The establishment of such a standard as we require for our work, implies the analyses of several thousand samples, extending over several years. More assistance than is at present given the office, is required to accomplish this work in anything short of a number of years of patient, tedious work, which will be in every sense a mere and necessary preliminary to the better work, and surer detection of adulterations, which the office hopes in the future to accomplish. Fortunately, the extent to which adulteration of wine has been carried here, is so small, that we may hope that this work of establishing a standard will more than keep apace with the progress of the practice of sophistication. In conclusion, we may state that this work is first in importance as regards the certain detection of adulteration, and shall consequently occupy all the spare time of the office until accomplished. And it is of the utmost importance to honorable wine dealers, of particular moment to the wine producers, and of no small interest, both from a hygienic and financial standpoint to the State, that this work be pushed forward with all due haste.

The following is a detailed statement of the work done during the year, in a condensed form:

No.	Excess of K_2SO_4 Over 2 gms. per Litre.	Salicylic Acid.	Sulphites, (excess).	Boracic Acid.	Artificial Coloring Matters.	REMARKS.
60	-----	Absent.	-----	Absent.	-----	Extract (taken on 10 ^{cc} , dried at 100° to a constant weight)=7.962 gms. per 100 ^{cc} . Ash, per 100 ^{cc} = .220 gms. Sulphates (as SO_3), per 100 ^{cc} = .100 gms. Glycerine, per 100 ^{cc} = .960 gms.
61	-----	Absent.	-----	Absent.	-----	Sulphates (as SO_3), per 100 ^{cc} = .0369 gms.
62	-----	Absent.	-----	Trace.	-----	Glycerine, per 100 ^{cc} =1.130 gms. Sulphates (as SO_3), per 100 ^{cc} = .0404 gms.
63	-----	-----	-----	-----	-----	Glycerine, per 100 ^{cc} = .838 gms. Marked "Crystalline Wine Preservative." Found to be bisulphite of potash.
64	-----	-----	-----	-----	-----	Tannin, per 100 ^{cc} = .0092 gms.

No.	Excess of K_2SO_4 Over 2 gms. per Litre.	Salicylic Acid.	Sulphites, (excess).	Boracic Acid.	Artificial Coloring Matters.	REMARKS.
65	None.	Absent.	None.	Absent.	Absent.	
66	None.	Absent.	None.	Trace.	Absent.	
67	None.	Absent.	None.	Absent.	-----	
68	None.	Absent.	None.	Absent.	-----	
69	None.	Absent.	None.	Absent.	Absent.	
70	None.	Absent.	None.	Trace.	Absent.	
71	None.	Absent.	None.	Trace.	Absent.	
72	None.	Absent.	None.	Trace.	-----	
73	None.	Absent.	None.	Trace.	-----	
74	None.	Absent.	None.	Trace.	-----	
75	None.	Absent.	None.	Trace.	-----	
76	None.	Absent.	None.	Trace.	-----	
77	None.	Absent.	None.	Trace.	Absent.	
78	None.	Absent.	None.	Trace.	Absent.	
79	None.	Absent.	None.	Trace.	-----	
80	None.	Absent.	None.	-----	-----	
81	None.	Absent.	None.	Absent.	Absent.	
82	None.	Absent.	None.	Absent.	Absent.	
83	None.	Absent.	None.	Absent.	-----	
84	None.	Absent.	None.	Trace.	-----	
85	None.	Absent.	None.	Trace.	-----	
86	-----	-----	-----	-----	-----	(Bottle broken when received.)
87	None.	Absent.	None.	Trace.	Absent.	
88	None.	Absent.	None.	Trace.	Absent.	
89	None.	Absent.	None.	Trace.	-----	
90	None.	Absent.	None.	Trace.	-----	
91	None.	Absent.	None.	Trace.	Absent.	
92	None.	Absent.	None.	Absent.	-----	
93	None.	Absent.	None.	Absent.	-----	
94	None.	Absent.	None.	Absent.	Absent.	
95	None.	Absent.	None.	Absent.	Absent.	
96	None.	Absent.	None.	Absent.	-----	
97	None.	Absent.	None.	Absent.	-----	
98	None.	Absent.	None.	Absent.	-----	
99	None.	Absent.	None.	Absent.	Absent.	
100	None.	Absent.	None.	Absent.	Absent.	
101	None.	Absent.	None.	Absent.	Absent.	
102	None.	Absent.	None.	Absent.	Absent.	
103	None.	Absent.	None.	Absent.	Absent.	
104	None.	Absent.	None.	Absent.	Absent.	
105	None.	Absent.	None.	Present.	Absent.	
106	None.	Absent.	None.	Present.	Absent.	
107	None.	Absent.	None.	Absent.	Absent.	
108	None.	Absent.	None.	Absent.	Absent.	
109	None.	Absent.	None.	Absent.	Absent.	
110	None.	Absent.	None.	Absent.	-----	
111	None.	Absent.	None.	Absent.	Absent.	
112	None.	Absent.	None.	Absent.	Absent.	
113	None.	Absent.	None.	Absent.	Absent.	
114	None.	Absent.	None.	Absent.	Absent.	
115	None.	Absent.	None.	Trace.	Absent.	
116	None.	Absent.	None.	Trace.	Absent.	
117	None.	Absent.	None.	Trace.	-----	
118	None.	Absent.	None.	Trace.	-----	
119	None.	Absent.	None.	Trace.	-----	
120	None.	Absent.	None.	Trace.	-----	
121	None.	Absent.	None.	Trace.	Absent.	

No.	Excess of K ₂ SO ₄ Over 2 gms. per Litre.	Salicylic Acid.	Sulphites, (excess).	Boric Acid.	Artificial Coloring Matters.	REMARKS.			
						Mark.	Reaction.	Alum.	Glycerine.
122									
a	-----	Absent.	Present.	Absent.	-----	S. S. C.	Acid.	Absent.	
b	-----	Absent.	None.	Absent.	-----	N. C.	Acid.	Absent.	
c	-----	Absent.	None.	Absent.	-----	V. B.	Acid.	Absent.	
d	-----	Absent.	None.	Absent.	-----	pulverine appert.	Neutral.	Absent.	
e	-----	Absent.	None.	Lg. quan.	-----	Albumen en Poudre No. 1	Acid (stily)	Absent.	
f	-----	Absent.	None.	Lg. quan.	-----	Albumen en Poudre No. 2	Acid (stily)	Absent.	
g	-----	Absent.	None.	Absent.	-----	St. Julien Powder No. 1	Neutral.	Absent.	
h	-----	Absent.	None.	Absent.	-----	St. Julien Powder No. 2	Neutral.	Sm. quan.	
i	-----	Absent.	None.	Absent.	-----	St. Julien Powder No. 3	Neutral.	Absent.	
123									
a	-----	Absent.	None.	Absent.	-----	Fannin C. P.	Acid (stily)	Absent.	
b	-----	Absent.	None.	Absent.	-----	Spanish clay	Neutral.	Absent.	

No.	Excess of K ₂ SO ₄ Over 2 gms. per Litre.	Salicylic Acid.	Sulphites, (excess).	Boracic Acid.	Artificial Coloring Matters.	REMARKS.
124	None.	Absent.	None.	Absent.	-----	Extract (dried at 100° for 3½ hours) 5.262 gms. Specific gravity (21° C.), 1.1003. Alcohol (absolute alcohol by weight), 10.74 per cent. Sulphates (as K ₂ SO ₄), .05396 gms. Glycerine, .749 gms. Total acidity (as H ₂ SO ₄), .6336 gms. Volatile acidity (as H ₂ SO ₄), 2.588 gms. Sugar (as levulose), 1.09 gms. Ash soluble, .3235 gms. Insoluble, .0713 gms. [Weights given are per 100° of wine.]
125	None.	Absent.	None.	Absent.	-----	
126	-----	Absent.	None.	Absent.	Absent.	
127	None.	Absent.	None.	Absent.	Absent.	
128	None.	Absent.	None.	Absent.	Absent.	
129	None.	Absent.	None.	Absent.	-----	
130	None.	Absent.	None.	Absent.	-----	A sample of sal soda. * Up to this point samples were not examined for minute traces of boracic acid; but Nos. 152 to 177 inclusive, were (by flame test). Also samples from No. 185 on were tested for traces (by tu- meric paper test). Find traces of boracic acid by both flame and tumeric paper tests. (Bottle broken when received.)
131	None.	Absent.	None.	Trace.	-----	
132	-----	-----	-----	-----	-----	
133	None.	Absent.	None.	Trace.	Absent.	
134	None.	Absent.	None.	Absent.	Absent.	
135	None.	Absent.	None.	Absent.	Absent.	
136	None.	Absent.	None.	Absent.	-----	
137	None.	Absent.	None.	Absent.	-----	
138	None.	Absent.	None.	Trace.	-----	
139	None.	Absent.	None.	Trace.	Absent.	
140	None.	Absent.	None.	Absent.	Absent.	
141	None.	Absent.	None.	Absent.	Absent.	
142	None.	Absent.	None.	Trace.	-----	
143	None.	Absent.	None.	Trace.	-----	
144	None.	Absent.	None.	Trace.	-----	
145	None.	Absent.	None.	Absent.	-----	
146	None.	Absent.	None.	Absent.	-----	
147	None.	Absent.	None.	Absent.	-----	
148	None.	Absent.	None.	Trace.	-----	
149	None.	Absent.	None.	Absent.	-----	
150	None.	Absent.	None.	Absent.	-----	
151	-----	-----	-----	Absent.	-----	(Bottle broken when received.) Sample of oenotannin. Sample of cream of tartar.
152	None.	Absent.	None.	Trace*	-----	
153	None.	Absent.	None.	Trace.	-----	
154	None.	Absent.	None.	Trace.	-----	
155	None.	Absent.	None.	Trace.	-----	
156	None.	Absent.	None.	Trace.	-----	
157	None.	Absent.	None.	Trace.	-----	
158	None.	Absent.	None.	Trace.	-----	
159	None.	Absent.	None.	Trace.	-----	
160	-----	-----	-----	-----	-----	
161	None.	Absent.	None.	Trace.	-----	(Bottle broken when received.) Sample of oenotannin. Sample of cream of tartar.
162	None.	Absent.	None.	Trace.	-----	
163	None.	Absent.	None.	Trace.	Absent.	
164	-----	-----	-----	-----	-----	
165	-----	-----	-----	Absent.	-----	
166	-----	-----	-----	Absent.	-----	
167	None.	Absent.	None.	Trace.	-----	
168	None.	Absent.	None.	Trace.	-----	

No.	Excess of K ₂ SO ₄ Over 2 gms. per Litro.	Salicylic Acid.	Sulphites, (excess).	Boracic Acid.	Artificial Coloring Matters.	REMARKS.
169	None.	Absent.	None.	Trace.	-----	
170	None.	Absent.	None.	Trace.	-----	
171	None.	Absent.	None.	Trace.	Absent.	
172	None.	Absent.	None.	Trace.	Absent.	
173	None.	Absent.	None.	Trace.	Absent.	
174	None.	Absent.	None.	Trace.	Absent.	Find traces of boracic acid by both flame and tumeric paper tests.
175	None.	Absent.	None.	Trace.	Absent.	
176	None.	Absent.	None.	Trace.	Absent.	
177	None.	Absent.	None.	Trace.	Absent.	Find trace of boracic acid also by tumeric paper tests.
178	-----	Absent.	None.	Absent.	-----	Marked "Wine Finings." Reaction neutral; alum absent.
179	None.	Absent.	None.	Absent.	-----	
180	None.	Absent.	None.	Trace.	-----	
181	None.	Absent.	None.	Absent.	Absent.	
182	None.	Absent.	None.	Absent.	Absent.	
183	None.	Absent.	None.	Absent.	Absent.	
184	None.	Absent.	None.	Absent.	Absent.	
185	None.	Absent.	None.	Absent.	Absent.	
186	None.	Absent.	None.	Trace.	Absent.	
187	None.	Absent.	None.	Trace.	-----	
188	None.	Absent.	None.	Trace.	-----	
189	None.	Absent.	None.	Trace.	-----	
190	None.	Absent.	None.	Trace.	Absent.	
191	None.	Absent.	None.	Trace.	Absent.	
192						Wines made from grapes taken from vines that had been treated in June by the following solutions:
a	-----	-----	-----	-----	-----	(a) 1 oz. Paris green to 1 gal. water.
b	-----	-----	-----	-----	-----	(b) 1 oz. Paris green to 2 gals. water.
c	-----	-----	-----	-----	-----	(c) 1 oz. arsenic to 5 gals. water.
d	-----	-----	-----	-----	-----	(d) 1 oz. arsenic to 10 gals. water.
e	-----	-----	-----	-----	-----	(e) 1 oz. acetate of zinc to 2 gals. water.
f	-----	-----	-----	-----	-----	(f) 1 oz. acetate of zinc to 4 gals. water.
						But found in a, b, c, and d no trace of arsenic; and found in e and f no trace of zinc.
193						
194						
195						
196						
197						
198						
199	None.	Absent.	None.	Trace.	-----	
200	-----	-----	-----	-----	-----	Alcohol=12.15 per cent by weight.
201	-----	-----	-----	-----	-----	Alcohol=12.8 per cent by weight.
202	-----	-----	-----	-----	-----	Alcohol=15.6 per cent by volume.
203	None.	Absent.	None.	Trace.	Absent.	
204	None.	Absent.	None.	Trace.	Absent.	
205	None.	Absent.	None.	Trace.	Absent.	
206	None.	Absent.	None.	Trace.	-----	
207	-----	-----	-----	-----	-----	Alcohol=8.1 per cent by weight.
208	None.	Absent.	None.	Trace.	-----	Alcohol=10.05 per cent by volume.
209	None.	Absent.	None.	Trace.	-----	
210	None.	Absent.	None.	Trace.	-----	
211	None.	Absent.	None.	Trace.	-----	
212	None.	Absent.	None.	Trace.	-----	
213	None.	Absent.	None.	Trace.	-----	
214				Trace.	-----	Same as No. 158, but second vintage. Trace of boracic acid found by both tests.
215						
216	None.	Absent.	None.	Trace.	-----	
217	None.	Absent.	None.	Trace.	Absent.	

Samples marked A, B, C, D, E, and F were samples of grapes taken from wines that were treated last June with the following solutions:

A.—1 ounce of Paris green to 1 gallon of water.

B.—1 ounce of Paris green to 2 gallons of water.

C.—1 ounce of arsenic to 5 gallons of water.

D.—1 ounce of arsenic to 10 gallons of water.

E.—1 ounce of acetate of zinc to 2 gallons of water.

F.—1 ounce of acetate of zinc to 4 gallons of water.

[Samples No. 192 were wines made from grapes of which the above are samples.]

Mark.	Amount Taken—Grams.	Found by Marsh's Test.	REMARKS.
A	285	A faint mirror of arsenic.	According to Johnson and Chittenden, a "distinct" mirror indicates about .000007 grams of metallic arsenic, while a "faint" mirror indicates but .0000007 grams of the element.
B	332	A faint mirror of arsenic, even fainter than obtained for A.	
C	377	Arsenic, but less than in D.	
D	382	Good metallic mirror of arsenic; found arsenic to weigh about .00005 grams.	
E	280	No zinc.	
F	253	No zinc.	

THE ARSENIC REMEDY FOR GRASSHOPPERS.

[Report to State Board of Viticultural Commissioners, by W. B. RISING, State Analyst.]

During the summer of 1885 the grasshoppers had made such ravages upon the vines and fruit trees in many parts of the State that the vineyardists and fruit growers were obliged to resort to what seemed almost desperate remedies to save their crops. I refer to the rather liberal use of arsenic, mixed with bran, middlings, and syrup, made into a stiff paste and then set before the advancing army of grasshoppers. The remedy proved effectual, and the destroying pests were checked and the crops saved. The question was now raised, whether the fruit from vineyards and orchards where this remedy had been used was not poisoned, or at least might not contain enough of the poison to make its use injurious.

At this crisis I was called upon, as State Analyst, by your Board, to visit the districts where the arsenic had been used, and to report if in my opinion any danger was to be feared from the use of grapes and fruits from those vineyards. I immediately entered upon this investigation, going to the vineyards where the arsenic had been used, observing carefully the manner of its application and subsequent treatment. I also studied carefully the habits of the grasshopper, and its behavior both before and after eating the arsenic. I gathered a large amount of material for subsequent chemical examination. I ought to add that I was everywhere received most cordially, and every assistance possible rendered me in the pursuit of my investigation. I also received much valuable information in regard to the habits of the grasshopper from the very intelligent and observing vineyardists.

Two methods of investigation seemed open to me: one experimental, *i. e.*, by taking samples of fruit in large quantities, and from places where the arsenic had been used most freely, and then testing these large samples in the laboratory for arsenic; the other involved the considerations of all the possible methods by which arsenic could be conveyed to the fruits, and then by observation and examination either confirm or refute these possibilities.

I shall consider this second line of study first. In what way could the arsenic be lodged upon the fruit? The possibility of its absorption by the plant, and deposition in the fruit, I assume as fully settled by experiments in the negative. I shall refer to this in another connection, and for the present drop it with a simple denial. Could any atmospheric agencies transport it and lodge it upon the fruit? Could the winds blow it about and deposit it there? The method universally adopted in applying it precluded this possibility, as it seemed to me. It was applied as thick paste deposited upon pieces of shingles or shakes placed upon the ground. This paste hardened or thickened on exposure to the air or sun, and in no case did it become crumbly or powdery, or in a condition to be blown about. It remained a coherent mass upon the shingle where it was placed. The grapes were clean, and a strong lens failed to show any dust lodged upon them. The arsenic does not evaporate or volatilize at ordinary temperature, and so could not condense again upon any near object. No rain fell during the time of exposure, so that water could not, in any way, have transported the poison. As the result of examinations of this sort, I could

not escape the conclusion that there was no probability, and hardly the faintest possibility, that any atmospheric agency could transport the poison. Could any animal do it? Could the grasshoppers themselves do it? This was quite possible, and the examination alone could decide.

In one or two cases I observed that the grasshoppers, having got into the mass when very thin and syrupy, had afterwards crawled upon the leaves. Their course could be accurately followed on the leaves, because the arsenic, in this moist condition, killed the substance of the leaf touched, so that a dry and brown line on the leaf gave the track of the grasshopper. Cases of this sort were extremely rare, and in no case could I see the mark of the grasshopper upon the grapes themselves. If the arsenic had touched them at any point when green, a dead and gnarled spot would have been formed. After recognizing the tracks of the grasshoppers on the leaves, great care was taken in the examination, but no second case was found. A theory had been suggested that the grasshopper might have vomited the contents of his stomach, including the arsenic, upon the grapes, and in this way the poison be communicated to the consumers of the fruit. Close observations failed to discover any instances of this. The habits of the pest were such as to make such an accident most improbable. Immediately upon eating the arsenic, he sought the shade. Mr. Goodman, of Fresno, assured me that he had watched them carefully, and in every case, immediately upon eating the poison, they had sought the shade, or water, if any happened to be near. A striking confirmation of this fact is found in the location of the dead bodies of the grasshoppers. They are invariably to be found under the vines; hardly a single one was to be seen until the vines were moved, and then hundreds were in full view under a single vine. I watched carefully for dead grasshoppers in the clusters of the grapes; I can only say that I found none; it may be that now and then a dead grasshopper may have become entangled in the bunches, but I can assert that it must have been a rare occurrence. In some places, I observed a very considerable amount of grasshopper excrement upon the foliage and among the clusters of the grapes. I collected a quantity of this excrement from the foliage, and took it to my laboratory for examination. The subsequent examination of this excrement showed that it did not contain a trace of the poison; even when large quantities were taken, there were no traces of the arsenic to be discovered by the chemical tests. The bodies of the dead grasshoppers, on the other hand, gave large amounts of the arsenic, leaving no doubt as to the efficiency of the remedy.

The results of my observations in the vineyards gave only negative indications. As a final test, I picked myself in spots where the arsenic had been used most freely, from thirty to forty pounds of grapes in each of the different vineyards.* These were examined for arsenic. In none did I

*In this examination of the grape for arsenic they were carefully and repeatedly washed with a dilute solution of caustic potash, and finally with pure water. The wash water and alkali were evaporated to a small volume, and then tested by Marsh's apparatus, for the presence of arsenic. In two samples out of the three taken, a very faint trace of arsenic was discovered, estimated to be equal to the one thousandth part of a grain of white arsenic from thirty to thirty-six pounds of grapes. This test was not apparent upon the first heating of the tube, but only after the lapse of considerable time. In carrying out this examination I was compelled to consider anew the question of removing arsenic from metallic zinc. It is generally agreed among chemists that all methods proposed up to this time have failed to remove the arsenic entirely from the zinc. I was led from certain considerations to use chloride of zinc, stirred into the molten zinc, to be purified. The chloride of zinc can be easily prepared by the action of ammonium chloride to the molten zinc when exposed to the action of the atmosphere. By constantly stirring this chloride of zinc into the molten zinc, the arsenic is quickly and perfectly removed. Zinc which, before treatment, gave a strong reaction for arsenic, after the treatment failed to give the reaction, even when put to the severest test. A weighed quantity of metallic arsenic was added to

obtain more than the faintest trace of this substance, an amount absolutely inappreciable, and too small to have any perceptible action upon the human body. This conclusion, as soon as reached, was communicated to Mr. Charles A. Wetmore, Chief Executive Viticultural Officer, and by him published in the dailies of the State.

Some other interesting and important questions still remained to be considered.

If the arsenic should be left upon the soil, what dangers are to be anticipated to the vines, trees, or future crops? What possibilities are there of the arsenic being taken into solution by the water and then entering the springs, wells, or streams which may be used for domestic purposes? It would also be a matter of interest to inquire whether arsenic is known to occur in any appreciable quantity in any arable soils; are there any well authenticated instances in which arsenic is known to have been applied to a soil by accident, or otherwise, and with what result? Does arsenic occur in any spring water, or in any mineral spring that has been used by man for any period, and with what results?

* Vöhl found a very appreciable quantity of arsenic in the boiler scale of a steamer that ran from Cologne to Mühlheim, on the Rhine.

† Walchner, for many years member of the Mining Directory of the Grand Duchy of Baden, had occasion to investigate the iron ores of that country, and found that they almost universally contained arsenic in small quantities. As these ores were undoubtedly deposited from mineral springs, it occurred to him to test the deposits of iron springs still in existence. He found that these springs, or rather that iron deposits from them, contained arsenic. He then extended his observations to some of the celebrated mineral springs of Germany. He examined the deposits of the iron springs of the Black Forest (Griesbach, Rippolsau, Treinach, Rothenfels, and Caunstadt), and also of Wiesbaden, Schwalbach, Ems, Pyremont, Lamscheid, and of Brohlthals, near Andernach. The iron deposits of those springs all contained arsenic and other metals, and it is supposed that some of their medicinal properties may be due to this fact.

Walchner, having called the attention of chemists to this occurrence of arsenic, further investigation showed that its presence had been overlooked in very many cases. He began the investigation of soils in the neighborhood of Heidelberg, and found abundant and clear evidence of the presence of arsenic in those ferruginous soils.

‡ Professor Will, in a very careful and exhaustive analysis of the springs of Rippoldsau, confirms the statements of Walchner. He found very considerable quantities of arsenic in the deposits from these springs.

§ Professor Bunsen found that twenty-five out of thirty-eight mineral springs, in the Grand Duchy of Baden, contained arsenic. Many other mineral waters are known to contain this substance. It seems almost impossible to escape the conclusion that arsenic is widely distributed in nature, and when proper methods have been taken to discover this sub-

the zinc, and samples of the zinc taken every five minutes. It required two and one half hours treatment to remove one hundred and twenty-five grains of arsenic from one and one half kilograms of zinc. Each fresh addition of chloride of ammonium liberated when stirred into the zinc a very distinct odor of garlic, and was a means indicating the presence of the arsenic. Shortly after the disappearance of the garlic odor the zinc was found to be free from arsenic. A four hours' treatment in Marsh's apparatus failed to show the faintest trace of arsenic.

* *Berichte der Deutschen Chemischen Gesellschaft*, Berlin, 1877, p. 1813.

† *Liebig's Annalen der Chemie und Pharmacie*, vol. 61, p. 205.

‡ *Liebig*, an. 61, p. 181.

§ *Fresenius Zeitschrift für Analytische Chemie*, 1871, p. 436.

stance in connection with iron deposits, it will almost certainly be found there.

Arsenic is known to be present in the immediate neighborhood of many metallurgical works.

An analysis of the soil in the neighborhood of the Muldener Hütte in Freiberg by *Stöckhardt, showed the presence of arsenic for a distance one thousand yards and more from the works. It could not well be otherwise, when thousands of tons of ore have been roasted, which contained arsenic. This substance is almost entirely expelled, and passes into the atmosphere, and in a short time is brought to the earth again, in the neighborhood of the smelting works.

The presence of arsenic in soils is not a new discovery, but has been a practical problem for generations. This problem has been the subject of scientific investigation, especially during the last thirty or forty years, and the most important points well considered.

†Stöckhardt remarks, in regard to the action of the fumes of arsenic in the neighborhood of the works in Freiberg: "Even in the near neighborhood of the arsenic works, at a distance of sixty to seventy yards, the fields were everywhere cultivated, either for meadow or forage crops, and field crops, and did not appear to be specially affected, comparing similar slopes and similar soils. Among the grains, the oats seemed to be the most sensitive to the fumes, etc."

This subject was taken up by Dr. McMurtrie,‡ the chemist of the Agricultural Department in Washington. Paris green had been used at the time in considerable quantity for the potato pest, and the question of danger to the vegetation was then raised. He was unable to find any arsenic in the tuber of the potato. These experiments were continued, and varying quantities of arsenic, in the form of Paris green, arsenite of potash, and arseniate of potash, were used. He came to the conclusion that nine hundred pounds of Paris green to the acre, four hundred pounds of arsenite of potash, and one hundred and fifty pounds of arseniate of potash, might be applied without injury to the plants.

I will not attempt to give a full synopsis of the literature upon this subject, but will content myself with a brief summary of the most important recent investigations.

Dry arsenic sprinkled upon the foliage of a plant has but little, if any, action on the plant. Fumes of arsenic under a tree, or in contact with a hardy plant, seem to be entirely without action on the plant. A solution of arsenic is a poison to the plant, and all plants are quickly affected by it. Very small amounts may be absorbed by plants—succulent plants being most sensitive to the poison—and but little change is observed. A careful analysis of such plants may show a trace of arsenic. §Jäger found tests for arsenic in certain dried plants, which had been grown in soil containing arsenic. ||Von Gorrop-Bessanez detected the presence of this element in one hundred and forty grammes of dried buckwheat straw, grown in a soil to which the arsenic had been added—thirty grammes As_2O_3 intimately mixed with 30.7 cubic decimeter soil.

Professors Nobbe, Baessler, and Will, in the Landwirthschaftlichen Versuchungs-Station, 1884, pages 381-419, have taken up the action of arsenic

* Di Beschädigung der Vegetation durch Rauch v. Schröder and Reuse, p. 53.

† Ueber die Einwirkung des Rauches der Silberhütten auf die beanachbarte Vegetation. Polytechnisches Centralblatt, 1850, p. 267, and V. Schröder and Reuss, p. 20.

‡ Report of the Commissioner of Agriculture, 1874, p. 152. Report of the Commissioner of Agriculture, 1875, p. 144.

§ Ueber die Wirkungen des arseniks auf Pplanzen, Stuttgart, 1864.

|| Liebig's Annalender Chemie und Pharmacie, vol. 127, p. 248.

upon plants, and in a prolonged and exhaustive investigation, have come to the following conclusions:

I. "Arsenic in solution is an exceedingly active poison to plants. The addition of one one millionth to the culture solution produces an appreciable disturbance of growth.

II. "The element enters in very *small* quantities only into the plant; it is impossible to introduce an appreciable quantity.

III. "The action of arsenic proceeds from the roots upward, whose protoplasm is disorganized and deranged in its osmotic action; the rootlet dies without growth.

IV. "The parts above ground show the action of the arsenic first by strong wilting, recovering slowly, followed by death.

V. "By obstructing the transpiration (*i. e.*, shutting off the light, placing in a warm, moist room, etc.), it is possible to maintain the growth of plants in an arsenic solution for a time, without, however, removing the poisonous action of the arsenic, which asserts itself later."

All investigations seem to agree in this general conclusion. There is no danger of arsenic being taken up in such quality by the plant that injury can result from the use of the plant as food. If very much or even an appreciable amount should be taken up by the plant it must surely die. The sprouting of seeds is destroyed by solutions of arsenic; so that where there is a large amount of this substance in the soil it simply becomes barren.

The danger of contaminating wells will appear small after what has been said upon the wide distribution of this element in nature, and its occurrence in certain mineral waters. We have but few experiments to test the power of soils to retain arsenic. *Von Gorrup-Bessanez used a very small amount of soil and retained 40.15 per cent of the arsenic. It may safely be presumed that a ferruginous or highly calcareous soil would practically retain the whole, so that the water filtered through it, although it might be mixed with the poison, would only contain a mere trace.

A few words of caution should be added to what I have said in regard to the use of this very deadly poison. It is a *poison*, and this must always be kept in mind. It should be gathered up and not left upon the land. If a manufacturing chemist is near he can easily convert it into pure arsenic again. If boiled with wheat or other grain it may be used for poisoning squirrels.

W. B. RISING,
State Analyst.

* Liebig's Annale der Chemie and Pharmacie, vol. 127, p. 252.

REPORT

OF THE

STATE BOARD OF SILK CULTURE

OF

CALIFORNIA,

FOR THE YEAR 1888.

OFFICE OF THE BOARD:

Flood Building (Rooms 91 and 92), San Francisco, Cal.



SACRAMENTO:

STATE OFFICE, : : : : J. D. YOUNG, SUPT. STATE PRINTING.
1888.



OFFICERS AND MEMBERS OF THE BOARD.

HON. G. W. T. CARTER, President.....	Fresno.
HON. W. Z. PRICE, Vice-President	San Mateo.
R. H. McDONALD, Jr., Treasurer	San Francisco.
S. A. SELLERS, Secretary	Brentwood.
ISAAC TRUMBO	San Francisco.
J. J. RIVERS	Berkeley.
J. O. MILLS	San Francisco.

OFFICE OF THE BOARD:

Flood Building, rooms 91 and 92.....San Francisco.

STANDING COMMITTEES.

EXECUTIVE AND FINANCE—R. H. McDonald, Jr., Chairman; W. Z. Price and S. A. Sellers.

FILATURE COMMITTEE—W. Z. Price, Chairman; R. H. McDonald, Jr., and L. Rienzi.

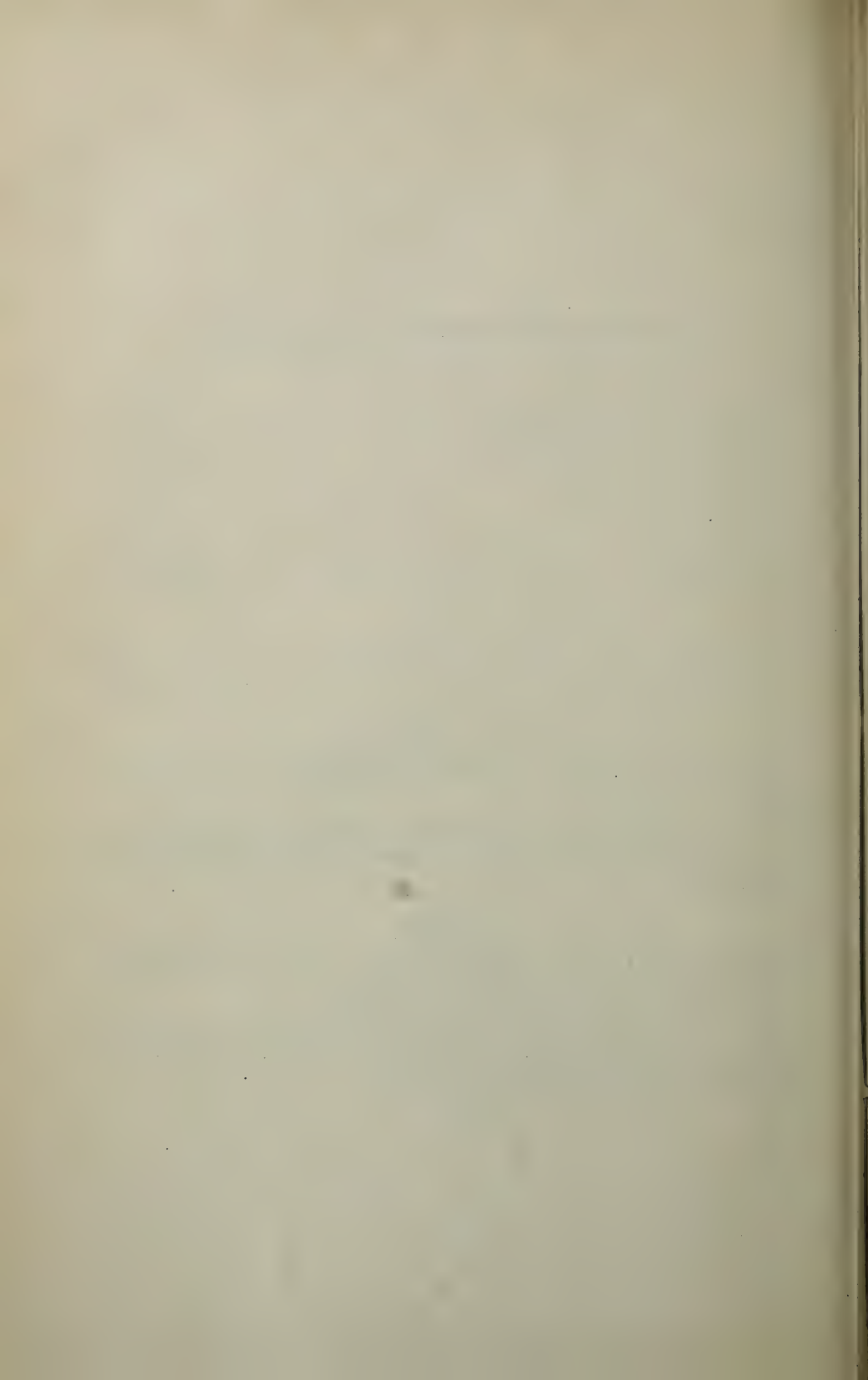
COCOON AND MULBERRY TREE COMMITTEE—S. A. Sellers, Chairman; R. H. McDonald, Jr., and L. Rienzi.

MEETINGS.

The Board meets at rooms 91 and 92, Flood Building, for the transaction of business, on the third Saturday of every month, at one o'clock P. M.

The annual meeting occurs on the first Saturday in November.

All correspondence to be directed to office of State Board, where Mrs. L. Rienzi may be consulted on matters relating to silk culture.



BY-LAWS.

MEETINGS.

1. The Board shall meet monthly, on the third Saturday of each month, at one o'clock P. M.

2. The annual meeting shall be held on the first Saturday in November, to consider the annual reports, and for the annual election of officers.

3. Special meetings may be held, to be called by the President upon the written request of any three members, provided three days' notice be given for any such special meeting.

4. All meetings shall be open to the public, and four members present shall constitute a quorum for the transaction of business.

5. Occasional public meetings may be held in different parts of the State under direction of the Board.

OFFICERS.

The officers shall be a President, Vice-President, a Secretary, and a Treasurer.

DUTIES OF OFFICERS.

1. The President (in his or her absence, the Vice-President) shall preside at all meetings, sign the minutes when duly approved, appoint all vacancies in committees authorized by the Board, countersign all claims for money drawn by the Secretary on the Treasurer, and perform such other duties as the Board may direct.

2. The Secretary shall keep a faithful record of all the proceedings of the Board, see to its correspondence, and perform such other duties as are required by the Act, or the Board may direct.

3. The Treasurer shall, in addition to the duties prescribed in the Act, report the condition of the treasury at each monthly meeting, and submit all books and vouchers for examination when required by the Board.

COMMITTEES.

Standing committees shall be appointed as follows:

1. Executive and Finance Committee.

2. Silkworm Eggs, Cocoons, and Trees.

3. Filature and Reeling School.

Each standing committee shall consist of three, of whom the first named shall be Chairman. Each committee shall keep a record of all transactions in books prepared for that purpose, such books becoming part record of the Board.

DUTIES OF COMMITTEES.

1. The Executive and Finance Committee shall examine and approve all bills, examine the Secretary's and Treasurer's books

and accounts, whenever required by the Board, and have general supervision over all the finances of the Board.

2. The Silkworm Eggs, Cocoons, and Trees Committee shall have charge of the purchasing, care, distribution, and sale of eggs, cocoons, and trees; also, of books, pamphlets, etc., which will further the silk raising industry in the State; they shall have power to consult with silk producers, scientists, or organizations of a similar nature, and in every way seek to give such information and aid as will make silk raising in California a practical possibility.

3. The Filature and Reeling School Committee shall have charge of the purchasing of cocoons and reeling of the same; they shall recommend suitable rooms and employes for the school, arrange for exhibitions at State, County, or City Fairs, and in every way promote the interest of the industry.

4. No member of the Board, and no committee, shall contract any debt unless authorized to do so by the Board.

ORDER OF BUSINESS.

1. Roll call.
2. Reading of minutes.
3. Report of Secretary.
4. Report of Treasurer.
5. Report of standing committees:
 - (a) Executive and Finance.
 - (b) Silkworm Eggs, Cocoons, and Trees.
 - (c) Filature and Reeling School.
6. Report of special committees.
7. New business.
8. Adjournment.

The object of the Board of Silk Culture is to propagate the silk industry throughout the State of California, to instruct women and children in the best method of rearing silkworms, and the reeling of silk from cocoons.

The silk industry relates to the rearing of silkworms and the production of their cocoons. In other countries where this has become an established industry the work is largely done by women, young girls, children, the aged and the infirm. Men have little to do with it, except during the very busy period of eight or ten days.

Everything in the birth, life, and the work of the silkworm is wonderful. Its care is peculiarly adapted to women. Let the men plant the mulberry trees around their homes; then let them hand the industry over to the women—children of their households. Those who will do so will make it possible for their families to contribute materially to support of the same.

RULES AND REGULATIONS FOR THE FILATURE.

1. The filature shall be open to the public daily, except Sundays and holidays, from 9 A. M. to 12 M. and from 1 to 4 P. M. Six hours will be counted one day's work.

2. Instructions will be given, free of charge, to as many at one time as the Committee on Filature deem desirable.

3. No pay will be allowed to beginners for the first eight weeks, and after that time such compensation as the proficiency in the work will justify.

4. The Board will endeavor to make the work, to those who desire to learn the art of silk reeling, as pleasant as possible, but reserve the right to discharge any pupils who, in their opinion, will not make good reelers, or fail to comply with the rules and regulations.

5. All cocoons to be delivered at the filature free of charge.

6. Cocoons will be purchased by the Board, this season, at \$1 40 for first class, \$1 25 for second class, and \$1 for third class; or, the cocoons will be weaved free of charge and the silk returned to the producer.

7. Advances will be made on any shipment of cocoons, but no final settlement will be made until the value of the cocoons is ascertained.

8. As the Board is created by, and obtains its funds from, the State, the filature is for the benefit of California, and the above rules apply only to cocoons raised in the State.

Adopted and approved May 28, 1885.

REPORT.

STATE OF CALIFORNIA,
STATE BOARD OF SILK CULTURE DEPARTMENT,
SAN FRANCISCO, December 1, 1888. }

To honorable R. W. WATERMAN, Governor of California:

SIR: In accordance with the requirements of law I have the honor, herewith, to submit the report of this department for the thirty-eighth fiscal year, and the thirty-ninth fiscal year, 1888:

During the past year the correspondence received by this Board was very large. Letters were received from parties in the different counties of this State, requesting information on silk culture. A letter was received from Honolulu, requesting information from this Board as to the best plan of starting a silk culture station in that place.

The California State Board of Silk Culture is becoming well known among those interested in silk culture, and is considered the best authority in the United States on the subject. The different silk societies, both local and foreign, are continually requesting this Board to give them the desired information, so as best to advance this important industry.

This Board has established in its rooms, 91 and 92, Flood Building, the best and most complete filature in the United States. It has the latest improved reeling machines, imported directly by this Board, and it is well worthy of a visit from the people of California. Many visitors to this coast visit the rooms of the Board to see the working of this interesting industry. They will bear back with them the news that California can produce silk, and prepare same for the manufacturer. During the past year there has been one thousand and fourteen visitors to witness the reeling of silk, etc. The children of the local schools have been studying silk and silk culture. Daily visits have been paid to the rooms of this Board by the pupils, who were desirous of familiarizing themselves with the process employed in reeling silk from the cocoons.

Mr. Leyser, the Principal of the John Swett Grammar School, has forwarded to this Board the essays and sample cards worked by the pupils of this school. It shows the interest the school children are taking in silk culture, and they glean some practical ideas of one of the growing industries of this State, and as silk culture is peculiarly adapted for women and children, these school children are receiving a knowledge that may be of practical benefit to them in the near future.

This Board has reared over eighty thousand silkworms in its rooms during the months of April, May, and June; in so doing, it has endeavored to spread the practical knowledge how to care for silkworms.

During the time the silkworms were being reared, many visitors were attracted to the rooms to watch the busy insect performing the

work for which it was created—spinning the thread of silk for the adornment of men, women, and children.

The Board has had manufactured a silk flag from the silk product of California, the cocoons of which were raised in this State; the silk reeled at the filature of this State Board of Silk Culture; as there are no manufacturers of broad silk on this coast, the silk had to be sent East to be woven. The silk flag demonstrates what can be done by our women and children of California.

The last fiscal year it was impossible for this Board to make an exhibit at the Sacramento State Fair or at the Mechanics' Institute, San Francisco, as in former years, on account of lack of funds. Exhibiting at fairs is an important factor in developing this industry, as so many persons are enabled to study an industry peculiarly adapted to California.

This Board has been encouraging parties rearing silkworms by purchasing their cocoons, thus making a market for their product, and as the silk industry will be one of the main industries of this coast in the near future, it is necessary to sustain this industry until it is well established throughout California.

From statistics received from Mr. E. B. Jerome, Special Deputy Collector for this port, it is seen that the value of raw silk imported into this port from China and Japan during the year ending June 30, 1888, was \$12,069,430. These figures show how necessary it is to develop this industry in this State, so that that amount of money may be kept here at home among our women and children, as they are capable of rearing silkworms and to reel the silk; and with a little encouragement from the government of our State, in a few years the women will be so educated in the silk industry that they will be able to raise all the silk consumed in the United States.

The Board has distributed silkworm eggs to parties wishing to rear the worms. The subject of silk culture has been attracting a good deal of attention in the southern part of the State, particularly around San Diego, from which place this Board has received numerous communications asking for information. One gentleman writes he has already prepared ten acres of land to be devoted to the industry. Another writes that he has made several successful experiments, and has decided to devote his time and money to the silk industry. In no case is there any doubt expressed as to the final result.

A diploma of merit was awarded to the California State Board of Silk Culture, for a meritorious display of California silk at the New Orleans Exposition.

The foundation of the silk industry in this State is food for the silkworms. This can only be had from the mulberry tree, of which but an insignificant number are as yet grown. The industry in its growth is confined to the rate at which the planting of the mulberry is pushed. It is therefore obvious that one great essential in the building up of the industry is to extend the planting of the mulberry as fast as possible. The Board fully recognizes this, and during the past year have sent out trees and cuttings of the mulberry to the extent of its ability to do so. But with the small appropriation allowed by the last Legislature, it was impossible to keep up the expenses of the Board and filature and supply the great demand made upon it for trees, etc.

During the past year the amount appropriated by the last Legislature was so small that it almost paralyzed work of the Board in its

efforts to advance the silk industry in the State, and therefore it was impossible to carry out the Act to its full intent and purpose.

This Board, by judicious management, has kept the flame burning, although the last month of the thirty-ninth fiscal year there were no funds in the State treasury to meet the current expenses of the month of June, 1888.

The original appropriation of \$5,000 per annum will be none too much to meet the demand for trees and cuttings that is now coming in, and to keep up the general office so that information may be sent out to those interested in extending and developing silk culture.

The time has arrived when a larger appropriation is necessary, with the rapid increase of new settlers in this State who intend to make the rearing of silkworms one of the products of their farm.

The mailing list of this office has increased so rapidly that the present clerical force is inadequate for the work that is to be done. Many times the work in the Secretary's office was so rushed that it was necessary to work evenings.

This Board has moved into larger quarters in the Flood Building. We find that in our new quarters the number of visitors seeking information is greater.

This Board is in need of a new engine as motor power to drive the shafting of reeling machines in filature.

We estimate that \$5,000 per year will be necessary for this Board to carry out, to the best advantage, the purpose and intent of the Act that created this Board.

The members of this Board have rendered valuable assistance by their judicious suggestions, and their services have been gratuitously rendered for the public good. The present officers and members are a courteous and harmonious body.

Very respectfully submitted.

S. A. SELLERS,
Secretary.

HISTORICAL SKETCH OF THE SILK INDUSTRY OF LYONS,
FRANCE.

BY BENJAMIN FRANKLIN PEIXOTTO, United States Consul.

It is well known that the silkworm (*ver a' soie*) had its origin in China, where, for a long time, this "*merveilleuse étoffe*" was preserved and kept a secret of State. Thirteen centuries have now elapsed since its introduction into Constantinople, and its presentation to the Emperor Justinian. It was, however, the great Italian republics of the middle ages which created the industry of silk in Europe.

From Italy it passed into France.

From the first half of the fifteenth century, Lyons certainly possessed some looms, installed, without doubt, by Italian families whom the civil wars of Guelfs and Ghibelines drove from Genoa, Lucca, and Florence. Lyons, which did not long suffer under the feudal domination of its archbishops, emancipated herself from the middle ages, organizing a liberal government which made the city, for the Europe of that day, the natural refuge of political exiles.

When Louis XI, in his celebrated ordinance at Orleans, on the twenty-third of December, 1466, decreed that manufactories of silk should be established in France by the side of Paris and Tours (his favorite cities), he designated Lyons, for there, said he, in the peculiar French of his time, "*en y a ja aucun commencement*" (there has not yet been a beginning).

Still, it was Tours that was most favored, and near that city, in the royal park of the castle of Plessis, the first plantations of the mulberry tree were made, the leaves of which nourish the silkworms. It was Tours, in fact, that held and conserved for a number of years the first rank.

But the manufacturers of Lyons gained little by little the superiority, thanks, no doubt, to its neighboring position to Italy, and at the commencement of the eighteenth century the silk industry centered itself here as completely as to-day.

It was to certain privileges, *lettres patentes*, joined to the ordinance of Orleans, which highly favored the industry, that Lyons, more particularly, owed this superiority. These privileges, exempting for twelve years the workers in gold and silk cloth, were conjoined with favors, *impôts*, *octrois*, etc., which, however much they afflicted the general public, and especially fell upon the backs of the poorer classes, protected this special industry. In fact, a special tax was levied upon the city to assist in developing this manufacture.

Twenty-eight years later, on the eighteenth of July, 1494, Charles VIII reinforced these privileges, ordaining that the silk stuffs should be marked with the seal of the city, and absolutely prohibited the entrance of any silk goods from foreign countries into France. This measure was adopted with a view to relieve the excessive taxation which prevailed, but it had but little effect; all

the great nobles and their wives continued to dress in the most sumptuous silks, garnishing their houses with like costly material, and as the French fabricators could not begin to produce the quantity and quality required, Italy was still permitted to introduce these goods, and they were received as well by the king himself as by others.

Francis I was too much a lover of luxury not to be interested in the silk fabrics of Lyons. Preoccupied in subduing the rebellion of Genoa, he determined to dispossess that city of its silk industry, the chief source, at the time, of its wealth, and to this end he carried off its workmen.

A charter issued in 1536 gave the most extraordinary privileges to those establishing themselves in Lyons in the manufacture of gold and silver cloths, damasks, velvets, satins, taffetas, and other silk goods.

No doubt many foreigners were attracted by these inducements. Among others, two Piedmontese, Turquet and Naris, who, in 1528, figure among the notables of the city, which was ever prompt to adopt those coming from across the mountains (and this fact may be mentioned as one reason of the city's continued prosperity).

In historical narratives, as well as in popular legends, these two Piedmontese are called the creators of the silk industry in Lyons, though in reality it had, before their advent, a very respectable footing, to which, however, they no doubt contributed in rendering it permanent.

If the silk industry of France was at this period accorded a monopoly, it should be remarked that those engaged in, or desiring to engage in the business, were permitted exceptional privileges and every possible liberty; the object of all laws and ordinances being to promote its development, and to offer, by their liberal privileges, the greatest inducements to attract foreign workmen. It was only in the seventeenth century that this industry of Lyons fell under the yoke of the corporative regime, accompanied by wardenships and royal surveillance and regulations; but its character was by this time too seriously formed, its traditions had taken too firm root, to be seriously affected by the "Maladies Royales," and it could offer a resistance which, as seen during the revocation of the Edict of Nantes, was too powerful to be gravely influenced.

Under Francis I "*la matiere premiere*" (raw silk) came almost entirely from Italy. In 1640, Lyons was declared the sole emporium through which all foreign silks destined for the manufactories of Tours, Paris, Nimes, etc., could pass. This measure was one of the principal causes of the superiority of the Lyonnaise manufactures, as it gave the city the precedence and choice of the market, abundantly and variously supplied. The solemn entry of Francis I in 1505, and Queen Eleanore in 1538, gave evidence unmistakable of the luxurious character and qualities of the stuffs of Lyons.

The entrance of Henry II, in 1548, still further proved the sumptuousness of its products and the great wealth of its fabricants. Among the brilliant cortege were four hundred and fifty-nine weavers and four hundred and forty-six dyers, all clothed in the most magnificent apparel, "stuff marvelously beautiful to see," as says an official chronicle printed by order of the Consulate of the city. After the corporations of the city came the foreigners, the Florentines, the Milanese, the Lucchese, the Germans, followed by the most

notable citizens. A brilliant procession, without parallel—a veritable stream like a scene of enchantment, where the waves of gold and silver, of velvet and satin, of damas and taffetas, succeeded each other with solemn regularity, for these rare fabrics had their hierarchy as well as the general society. At this period they did not regard the democratic mixture of tissues, with styles and patterns indefinable, and transitions without sense and coherency. It was a veritable epoch of the grandeur and magnificence of silk in all its plentitude and splendor.

In 1554 a royal edict acknowledged that Lyons possessed twelve thousand workers in silk. These figures did not include the ribbon weavers, who had been erected into a distinct corporation since the second of February, 1542. The dyers did not receive a regular incorporation before the fifteenth of March, 1581. They were very numerous, and even at that time excelled in those abilities which have since given them such preëminence (still maintained) throughout the world.

“There is no city in the kingdom,” says a memoir of the time, “upon whom God has bestowed so much favor as the City of Lyons, which succeeds in making silks of every variety and color.”

This extraordinary success was then, as it is to this day, attributed to the virtues of the waters of the Saône, which wash its borders on the west, as the swift running Rhône sweeps with its impetuous currents its shores on the east. At the same time that its workmen multiplied, the mulberry trees, which had found a genial soil, increased in their turn, and the cultivation of silk became greater and more successful.

On the fourteenth of July, 1551, a royal decree of Henry II, regulated the planting of trees in all districts suitable to their growth and the development and nurture of *magnans* or *magnaz* (*vers à soie*), silk-worms, which name has passed into that of magnaneries.

But the results of this planting were meager in the midst of the religious wars which then disturbed the land. It was Henry IV who in truth built up this branch of French agriculture, or, more properly speaking, silk culture. In 1601 he transformed the gardens of the Tuilleries into a nursery, and planted twenty thousand mulberry trees, which later were dispersed along the whole basin of the Rhône, under the influence of the Theatre d'Agriculture of Olivier de Serres.

The Lyonnaise fabricants were thus assured of finding henceforth in France a large quantity of the raw material. In fact, it was at this time that the silk culture arrived at its maturity and became completely naturalized.

Up to this period many of the manufactories belonged to Italians; their number and importance now diminished, and were superseded by the native French, who greatly enlarged and extended their operations. In the middle of the fifteenth century the weavers were spread in all parts of the city, which was still found to be too small for their number. They were obliged to construct new stories to their houses, and scale the surrounding hills with new habitations for the accommodation of the steadily increasing workers in ribbons, velvets, satins, and in fact, all who transformed the raw silk into every conceivable variety and elegance of material.

In 1680 Lyons possessed ten thousand looms, which employed sixty thousand workmen. It was now that the silk industry of Lyons, emancipated from foreign influence, created for itself a special and individual character. Though Italy still monopolized the manufact-

ure of fabrics of grand designs, as evidenced by the rare genius of Titian and Paul Veronese, who loved to clothe their personages in the rich and costly costumes then in vogue, Lyons disputed and successfully won preëminence for simple tissues, plain satins, and goods of medium price, the result of the discoveries and inventions of those whom she had nurtured in her lap.

In 1608, Dagnon invented a stuff of woven silk and wool, mixed with gold and silver, the beginning of those mixed goods (warp of wool and filling of silk) which have taken such proportions in the present century. At this time, also, Antoine Bourget created and produced gimp goods, gauzes, crapes, and linens woven with gold and silver threads. In 1630, Ferran conceived an entirely new textile or tissue, which, after his name, is still called Ferrandine. In 1655, Octavio Mey discovered the beautiful lustre given to white silks; James Fournier imported from England the manufacture of silk stockings; and a simple workman, Charlier, invented that weaving by which the Gobelin tapestry is so remarkably imitated; but even this did not equal the still more extraordinary gold finish perfected under the hands of Père Sebastian.

At the epoch of the great splendors of Louis XIV, the luxury of the palace and the royal fêtes greatly stimulated the fabrication of elegant hangings, church ornaments, and sumptuous raiment; the designs and styles, novel and unique, took that majestic character which marked the furniture of the period, escaping at length the reminiscences of the Italians, and assuming peculiarly national features.

France now entered the struggle with Italy, competing with her rival and teacher even upon the field of the finest weavings, the grand *façonnés*. She now exported her silk stuffs to all parts of Europe, reversing completely the era of Henry IV, when 4,000,000 gold crowns (\$8,000,000) represented her importations of this article alone.

In 1685 the edict of Nantes fell upon this prosperity with brutal force. In a few weeks, out of ten thousand looms, but one third were continued a week, and a year or two later only two thousand were employed. The frightful misery which marked the closing years of Louis XIV permitted no industry to revive, but the silk manufacturers of Lyons were too robust to succumb entirely, even under adversities so terrible. It took, however, more than half a century to replace them on their former prosperous footing. In 1739, seven thousand five hundred looms, employing forty-eight thousand five hundred and fifty persons, are enumerated. The statistics of 1753 give ten thousand looms, occupying sixty thousand workmen—the same number, in fact, as before the revocation of the edict of Nantes. There were seven hundred manufacturers at this period, and each year witnessed their increase. It was an era of expansion for the silk fabrics of Lyons, and the rays of its prosperity penetrated into the neighboring districts.

George François Simonnet (to whose memory, even at this late day, a statue is about to be erected), a silk manufacturer of Lyons, founded at this time, at Tarare, a factory for the weaving of muslins. For a long time previous, workshops, for dressing silk before it is dyed, had been established in the Valley of the Gier. The fabrication of ribbons, which had also existed here, now took the direction of St. Chamond, and then of St. Etienne, where it has now its principal seat. Tarare and St. Etienne form, to-day, two industrial centers,

perfectly distinct in the character of goods they produce, but Lyons created them both. The Valley of the Isère and the Côte du Midi witnessed a like expansion, where the influence of Lyons has developed the culture of the mulberry tree, as well as the spinning and the throwing of silk prepared for the looms. In 1775, a million and a half kilogrammes were twisted—one third of which was silk of native growth. In 1787, Lyons counted eighteen thousand looms, which gave employment to eighty thousand persons, while from ten thousand to twelve thousand *quintaux* (more than six hundred thousand pounds) of silk were used.

At this period Lyons was unrivaled throughout the world; her genius eclipsed all competitors in every department of silk workmanship. Venice and Genoa had long been passed, and in all Europe the marvelously beautiful silk goods of Lyons took precedence, and were everywhere in demand. Her designers had created for her *façonnés* (silk worked in every variety of patterns), a veritable artistic school, which excited universal admiration. But the conflict between the ancient régime and the new now became more accentuated at Lyons than anywhere else in France. Dragged into the revolution by a part of her inhabitants, at the moment that the foreign enemy invaded the frontiers of the land, Lyons became the theater of the most terrible scenes of anarchy. Her manufactures were dispersed, her capital plunged in ruin, her workmen flew to the army, and when the city again revived, under the name of the free Commune, there remained but two thousand five hundred looms for her once proud industry.

The new régime, however, was not long in reorganizing society, though it was a social condition very different from the former state, which had reposed upon the coexistence of a luxury the most extreme for the few élite, with the greatest misery for the multitude. Exceptionable productions no longer found as many sumptuous amateurs as before. The middle classes now began to predominate, not inconsiderable in number nor in wealth. They, too, desired fine goods, but at more moderate prices. This demand gave rise to new inventions and the production of fabrics answering to the changed conditions. Jacquard, one of the most remarkable of inventors, now came upon the scene with his discovery, whose rare combinations were destined to work a complete revolution, and contribute so beneficially to the happiness of the workmen.

Under the empire, the number of looms in Lyons did not exceed twelve thousand, but with peace and its blessed influence, they rose to twenty thousand in 1819, and twenty-seven thousand in 1827. In spite of the bloody insurrections of which the city was the scene in 1832-34, their number increased to forty thousand in 1837, and fifty thousand on the eve of the revolution of 1848. It is doubtful whether this number has since been exceeded, though the silk manufacture has greatly increased during the thirty odd years which have since elapsed. But the labor and the loom have since been transferred to the surrounding country, where, driven by the increased cost of living in the city, thousands have found homes, and in dull seasons find other occupations. Thus, though the silk industry of Lyons gives employment to-day to one hundred and twenty thousand looms, it is doubtful whether more than one fourth, or thirty thousand, are to be found located in the city proper. The rest are to be found scattered through this department (Rhône) and the neighboring departments,

principally of the Loire, the Ain, and the Isère. This dispersion of laborers has no doubt been attended with happy moral and social effects. In rendering the workmen more independent, and giving them proprietorship of their looms, it has also delivered them from the evils of narrow and contracted city lodgings, besides affording them other means of livelihood in dull and stagnant seasons.

The one hundred and twenty thousand looms above mentioned use nearly five million pounds of silk. The raw silk is prepared for the looms in the surrounding and southern departments, by from four hundred to five hundred great spinning mills, supplied with twenty thousand cassines for the reeling of the cocoons, and eight hundred establishments for throwing (moulinage) the silk, employing upwards of three hundred and forty thousand tavelles.

There are some three hundred manufacturing houses directing this great industry, among which are many small fabricants, whose competition, no doubt, diminish, to no inconsiderable extent, the profit of the large concerns.

These different manufacturing houses produce from five to ten and twenty millions, and several of the greater manufacturers as high as thirty and forty millions of francs annually of silk goods.

Around the manufacturers are grouped some fifty dealers in raw silk, whose transactions embrace the silks of all nations, but particularly those of Italy, Spain, the Levant, China and Japan, without considering the native crop. In this branch of the silk business there is often much speculation. Corners are made, as with us in wheat and other products, and large fortunes have been made and lost.

In addition to the foregoing, there are some sixty odd commission houses of more or less importance, having business with every part of the habitable globe, besides small commission merchants who fill orders for the interior trade.

In 1873, the official statistics gave one hundred and twenty thousand *metiers* (looms), and the production of the silk manufacturers at 460,000,000 francs, of which 20,000,000 were of silk goods mixed with other materials (cotton, linen, etc.). The number of hands employed at this period in the silk industry were estimated at eight hundred thousand to one million.

In 1881 there were nearly one hundred and twenty thousand looms employed, twenty thousand of which were power looms, and the production was 395,000,000 francs, 156,000,000 being of mixed stuffs.

Silk has made Lyons one of the richest cities in the world. Her merchants and manufacturers are princes; her weavers the aristocracy of the working classes—aristocrats even in their ultra democracy, the most skillful and independent of all known laborers. With a little more energy and enterprise, she might still compete with her Swiss and German rivals, and continue to hold the foremost place among the greatest of silk manufacturing centers. Whether she will “keep what she has got” and “get more,” is a problem which the near future alone will determine.

DOMESTICATED AND WILD SILKWORMS.

The prime reason, says the American Entomologist, why the mulberry silkworm must ever be *the* silk producer of commerce, aside from the superior quality and quantity of its silk, is, that it is a domesticated insect, and that the worm can be fed in large quantities in partial confinement and under control; further, that while enduring this artificial life, it shows no disposition to escape from the shallow trays upon which it is fed. All the other worms suffer more or less when brought together in large numbers, or when confined or sheltered, and in this fact, more than in any difficulty in using the silk, lies the secret of the failure to substitute any of them for *mori*. The hardiness and adaptability of *cynthia* to different climates cannot offset this objection; for it remains essentially a wild worm, and it will require many centuries of selecting and artificial rearing ere it can be domesticated to the same extent that is the *sericaria mori*. There never can be any dependence placed on the production of silk from worms growing wild on their food plants, as in such state their exposure to birds and other enemies will always render the cocoon harvest uncertain, and it is far more expensive and troublesome to protect both the wild worms and the trees on which they grow, than it is to raise the mulberry worm by the ordinary methods employed.

REPORT OF TREASURER.

To the honorable Officers and Members of the State Board of Silk Culture of the State of California:

GENTLEMEN: I herewith submit to your kind consideration and approval this, my biennial report as your Treasurer, for the thirty-eighth and thirty-ninth fiscal years. The Finance Committee have examined each and every bill or claim separately.

The following amounts have been paid by me within the past thirty-eighth and thirty-ninth fiscal years, to cover claims, as follows:

THIRTY-EIGHTH FISCAL YEAR.

	Number Warrant.	Amount.	Total Cash Paid Out.
<i>November, 1886.</i>			
Traveling expense, G. W. Carter, September 25, 1886.....	5,572	\$20 00	
Rent, J. G. Iis, July 1 to September 1, 1886.....	5,577	70 00	
Filature expense, Mrs. Soldavini, teacher, July 1st to Sept. 7th.....	5,578	89 35	
Filature expense, Bertha Spence, reeler, July 1st to Sept. 12th.....	5,579	48 00	
Traveling expense, S. A. Sellers, September 25, 1886.....	5,576	8 00	
Cocoons, B. H. Carter.....	5,573	11 35	
			\$246 70
<i>December, 1886.</i>			
Fair expense, Longley & Johnson, painting signs.....	5,579	\$14 00	
Fair expense, Georgina Martin, service as reeler.....		30 00	
Fair expense, services at Fair.....		6 00	
R. H. McDonald, money advanced for Fair at Sacramento.....		150 00	
G. W. T. Carter, money advanced for Fair at Sacramento.....		25 00	
Cocoons, Hilda Aderell.....		4 20	
Office expense, Mrs. L. Rienzi, C. B.....		10 00	
Cocoons, J. H. Marshall.....		9 90	
Cocoons, M. M. Gallado.....		5 95	
Cocoons, Ella Kelly.....		4 65	
Cocoons, Annie E. Logan.....		7 00	
Cocoons, Mrs. Wm. Knight.....		10 85	
Cocoons, George Hinde.....		90	
Cocoons, Mrs. T. M. Wells.....		21 00	
Cocoons, Mrs. H. S. Foote.....		2 15	
Filature expense, Mrs. Soldavini, teacher, Sept. 7th to Oct. 7th.....	6,297	40 00	
Filature expense, Bertha Spence, reeler, Sept. 12th to Oct. 12th.....	6,296	20 00	
Rent, J. G. Iis, September 1 to November 1, 1886.....	6,299	70 00	
Machinery expense, United States Custom duty.....		69 50	
Cocoons, Mrs. LaMontague.....		3 85	
Machinery expense, storage Oriental Warehouse.....		16 97	
Machinery expense, L. P. Degan, belting.....		7 75	
Cocoons, M. M. Gallado.....		5 60	
Office expense, Mrs. L. Rienzi, C. B.....		10 00	
Mulberry trees exchange on Paris, Casa d'Acclimazion.....		100 00	
Cocoons, Women's Exchange.....		1 40	
			646 67
<i>January, 1887.</i>			
Machinery expense, L. Huffschtmidt, plumbing.....		\$57 29	
Machinery expense, J. T. Jaques, carpenter work.....		11 00	
Office expense, Mrs. L. Rienzi, C. B.....		10 00	
Machinery expense, Joshua Hendy Machine Works.....		50 00	
Traveling expense, S. A. Sellers, November 20, 1886.....	6,293	8 00	
Traveling expense, G. W. Carter, Nov. 20 and Nov. 6, 1886.....	6,294	40 00	
Filature expense, A. Smith, silk frames.....	6,295	1 75	
Traveling expense, S. A. Sellers, December 18, 1886.....	7,627	8 00	
Filature expense, B. Spence, reeler, Oct. 12 to Dec. 12, 1886.....	7,629	40 00	
Filature expense, Mrs. Soldavini, teacher, Oct. 7 to Dec. 18, 1886.....	7,628	94 65	
Rent, J. G. Iis, Nov. 1 to Dec. 1, 1886.....	7,630	35 00	
			355 69

THIRTY-EIGHTH FISCAL YEAR—Continued.

	Number Without.	Amount.	Total Cash Paid Out.
<i>February, 1887.</i>			
Filature expense, B. Spence, reeler, Dec. 12 to Jan. 12, 1887	-----	\$20 00	
Rent, J. G. IIs, Dec. 1 to Jan. 1, 1887	-----	35 00	
Filature expense, Annie Naw, reeler, to Jan. 12, 1887	-----	7 25	
Filature expense, Henrietta Benhoff	-----	7 00	
			\$69 25
<i>March, 1887.</i>			
Rent, J. G. IIs, Jan. 1 to Feb. 1, 1887	-----	\$35 00	
Traveling expense, G. W. Carter, Jan. 15, 1887	-----	20 00	
Office expense, H. B. George, packing trees	-----	12 00	
Office expense, Flemming & Stetson, drayage	-----	21 55	
Traveling expense, S. A. Sellers, Jan. 15, 1887	-----	8 00	
Traveling expense, S. A. Sellers, Feb. 19, 1887	-----	8 00	
Mulberry trees, Casa d'Acclimazion, draft	-----	406 70	
Mulberry trees, freight, Casa d'Acclimazion, draft	-----	59 65	
Silkworm eggs, account Bandelli, draft	-----	30 00	
Silkworm eggs, Casa d'Acclimazion, draft	-----	30 00	
Office expense, "San Francisco Chronicle," advertisements	-----	3 45	
			634 35
<i>April, 1887.</i>			
Office expense, Mrs. L. Rienzi, C. B.	-----	\$10 00	
Machinery expense, United States Custom House duty	-----	65 25	
Office expense, Mrs. L. Rienzi, C. B.	-----	10 00	
Filature expense, B. Spence, reeler, January 12 to March 12, 1887	-----	80 00	
Filature expense, G. Martin, reeler, January 12th to March 12th	-----	30 00	
Filature expense, Nettie Green, reeler, Jan. 12th to March 5th	-----	21 00	
Mulberry trees, W. P. Edwards, cuttings	-----	10 20	
Rent, J. G. IIs, February 1st to March 1st	-----	35 00	
E. A. Edson, United States Custom entries	-----	6 00	
Mulberry cuttings, S. A. Sellers	-----	52 10	
Traveling expense, G. W. Carter, February 19th to March 19th	-----	40 00	
Traveling expense, S. A. Sellers, March 19, 1887	-----	8 00	
Office expense, "San Francisco Call," advertisements	-----	1 00	
Office expense, Mrs. L. Rienzi, C. B.	-----	10 00	
Office expense, Mrs. L. Rienzi, C. B.	-----	10 00	
Mulberry trees, Boden & Co., freight	-----	81 13	
Secretary, Mrs. S. A. Raymond	-----	120 00	
			589 68
<i>May, 1887.</i>			
Office expense, Mrs. L. Rienzi, C. B.	-----	\$10 00	
Office expense, Mrs. L. Rienzi, C. B.	-----	10 00	
Silkworm eggs, in full, G. B. Bandelli, draft	-----	20 00	
Machinery utensils, J. H. Borden & Co., freight	236	40 65	
Office expense, Mrs. L. Rienzi	-----	10 00	
Office expense, Renton, Holmes & Co., lumber	239	7 36	
Machinery utensils, Custom House duty, storage	238	31 25	
Traveling expense, G. W. Carter, April 12, 1887	14,988	24 30	
Traveling expense, S. A. Sellers, April 12, 1887	14,986	8 00	
Filature expense, G. Martin, reeler, March 12th to April 12th	14,990	15 00	
Filature expense, B. Spence, reeler, March 12th to April 12th	14,993	40 00	
Filature expense, Mrs. L. Rienzi, Instructress, April 2d to April 16th	14,996	75 00	
Filature expense, Belle McLeod, reeler, Feb. 20th to March 21st	14,994	10 00	
Filature expense, Lillie Rice, reeler, January 12 to Feb. 12, 1887	15,000	10 00	
Filature expense, Clelia Hudson, reeler, Feb. 12th to March 12th	14,998	10 00	
Rent, J. G. IIs, March 1 to April 1, 1887	14,985	35 00	
			356 56
<i>June, 1887.</i>			
Office expense, Mrs. L. Rienzi, C. B.	-----	\$10 00	
Cocoons, Miss Lulu Sutphen	-----	3 85	
Cocoons, Mrs. A. D. Wardrobe	-----	5 00	
Filature expense, L. Hufschmidt, repairing, plumbing	14,997	9 00	
Cocoons, C. A. Bengson	-----	4 40	
Cocoons, P. H. Carter	-----	3 05	
Office expense, Mrs. L. Rienzi, C. B.	-----	10 00	
Traveling expense, S. A. Sellers, April 16, 1887	14,991	8 00	
Mulberry cuttings, heeling in trees, S. A. Sellers	14,996	75 00	
Traveling expense, G. W. Carter, April 16, 1887	14,992	24 30	

THIRTY-EIGHTH FISCAL YEAR—Continued.

	Number Warrant.	Amount.	Total Cash Paid Out.
Cocoons, Wintie Brodt.....		\$1 00	
Drayage, Flemming & Stetson.....	15,941	1 80	
Filature expense, W. T. Garratt, valves, working.....	15,942	12 80	
Filature expense, Mrs. L. Rienzi, supplies.....	15,943	300 00	
Mulberry trees, Casa d'Acclimazion, draft.....		400 00	
Office expense, La Seta Journal, draft.....	15,994	11 00	
<i>July, 1887.</i>			\$879 20
Office expense, Mrs. L. Rienzi, C. B.		\$10 00	
Cocoons, Mrs. S. A. Sellers.....		26 90	
Cocoons, Mrs. A. A. Inman.....		33 90	
Cocoons, Mrs. A. D. Wardrobe.....		18 13	
Cocoons, Mrs. C. S. Babcock.....		147 55	
Cocoons, Miss Nellie Robinson.....		27 35	
Filature expense, G. Martin, reeler, April 14th to June 14th.....	242	30 00	
Filature expense, Martha Aspden, reeler, May 14th to June 14th.....	245	10 00	
Filature expense, Annie Campbell, reeler, Apr. 15th to May 15th.....	244	10 00	
Filature expense, B. Spence, reeler, April 12th to June 12th.....	243	40 00	
Filature expense, Mrs. L. Rienzi, silk expert, April 16th to June 16th.....	237	300 00	
Cocoons, Mrs. B. Herman.....		13 12	
Cocoons, M. A. Still.....		1 00	
Cocoons, Mrs. B. F. Olinger.....		5 60	
Cocoons, Carrie McLeod.....		6 47	
Cocoons, Mrs. C. L. Perry.....		6 95	
Cocoons, Miss May Gesford.....		23 80	
Cocoons, George Ebner.....		3 15	
Cocoons, Mamie Stone.....		1 75	
Cocoons, Mrs. S. A. Sellers.....		22 40	
Cocoons, Mrs. A. A. Inman.....		29 95	
Cocoons, Mrs. A. Scheggia.....		13 65	
Machinery utensils, Boden & Co., freight.....		3 41	
Cocoons, Miss Nellie Turner.....		24 25	
<i>August, 1887.</i>			809 33
Office expense, Mrs. L. Rienzi, C. B.		\$10 00	
Cocoons, S. A. Pressley.....		9 34	
Cocoons, B. H. Carter.....		2 20	
Rent, J. G. Iis, June 1 to July 1, 1887.....	1,434	35 00	
Traveling expense, L. Saufrignon.....	1,425	17 50	
Services, Mrs. Merritt.....	1,432	72 00	
Rent, L. J. Wickson.....	1,424	110 00	
R. H. McDonald, Jr., expense.....	1,428	12 20	
R. H. McDonald, Jr., Galli & Co.....	1,421	18 00	
R. H. McDonald, Jr., R. H. Follis, rent.....	1,423	10 00	
R. H. McDonald, Jr., Wm. Crowley.....	1,436	8 00	
R. H. McDonald, Jr., labor, etc.....	1,438	27 60	
R. H. McDonald, Jr., R. H. Follis, rent.....	1,439	20 00	
R. H. McDonald, Jr., J. Stevens, labor, etc.....	1,440	50 05	
J. S. Spaulding & Co.....	1,422	6 60	
Cocoons, Mrs. B. F. Olinger.....		80	
Cocoons, Mary Wint.....		1 05	
Filature expense, A. Smith, carpenter work.....	233	7 00	
Traveling expense, S. A. Sellers, May 7, 1887.....		8 00	
Traveling expense, S. A. Sellers, June 18, 1887.....		8 00	
<i>September, 1887.</i>			433 34
Traveling expense, G. W. Carter, May 7, 1887.....		\$24 20	
Traveling expense, G. W. Carter, June 18, 1887.....		24 20	
Machinery, Giovanni Battaglia, draft.....		115 58	
Cocoons, Mrs. H. M. Byran.....	14,999	6 60	
Machinery, freight, Colombo Annoni (605.30 francs), draft.....			
Mulberry trees, Casa d'Acclimazion (557.55 francs), draft.....		225 80	
Cocoons, Lizzie Cakebread.....		5 60	
Cocoons, Mrs. T. M. Wells.....		17 05	

THIRTY-EIGHTH FISCAL YEAR—Continued.

	Number Warrant.	Amount.	Total Cash Paid Out.
<i>October, 1887.</i>			
Cocoons, Fannie Cole		\$5 80	
Rent, J. G. IIs, April and June	4,717	70 00	
Rent, J. G. IIs, May	235	35 00	
Filature expense, B. Spence, reeler, June 12th to June 30th	4,720	12 06	
Filature expense, G. Martin, reeler, June 12th to June 30th	4,719	9 00	
Filature expense, Mrs. L. Rienzi, silk expert, June 16th to 30th		75 00	
Office expense, Mrs. L. Rienzi		15 00	
			\$221 86
<i>November, 1887.</i>			
Cocoons, Mrs. La Montague		\$2 80	
Office expense, Mrs. L. Rienzi		15 00	
Office expense, Mrs. L. Rienzi		10 00	
Office expense, Mrs. L. Rienzi		9 79	
			37 59
Total amount paid out			\$5,699 25
Received from State Controller		\$5,684 73	
Balance on hand, thirty-eighth fiscal year		261 92	
Received from Secretary, property sold		54 20	
Balance on hand			301 60
		\$6,000 85	\$6,000 85

THIRTY-NINTH FISCAL YEAR.

	Number Warrant.	Amount.	Total Cash Paid Out.
<i>August, 1887.</i>			
Giovanni Battaglia, freight on machines		\$129 70	
C. A. Edson, brokerage, etc., on machinery	5,249	3 70	
			\$133 40
<i>September, 1887.</i>			
United States Custom duty and storage on machines		\$71 50	
			71 50
<i>October, 1887.</i>			
Filature expense, B. Spence, reeler, July 1st to August 31st	5,245	\$45 00	
Filature expense, Mrs. L. Rienzi, silk expert, July 1st to Aug. 31st	2,250	175 00	
Filature expense, Mrs. L. Rienzi, silk expert, Sept. 1st to Oct. 1st	5,370	87 50	
Filature expense, Bertha Spence, reeler, Sept. 1st to Oct. 1st	5,369	25 00	
			332 50
<i>November, 1887.</i>			
Filature expense, Martha Aspden, reeler, July 1st to Sept. 1st	5,249	\$20 00	
Filature expense, Georgina Martin, reeler, July 1st to Sept. 1st	5,253	30 00	
Traveling expense, G. W. Carter, meeting September 17, 1887	5,252	20 80	
Rent, J. G. IIs, July 1 to September 1, 1887	5,246	70 00	
Traveling expense, S. A. Sellers, August 20 and Septembr 17, 1887	5,248	15 60	
Filature expense, Martha Aspden, reeler, Sept. 1st to Oct. 1st	5,365	15 00	
Filature expense, Georgina Martin, reeler, Sept. 1st to Oct. 1st	5,366	20 00	
Traveling expense, S. A. Sellers, October 13th and October 20th	5,364	16 00	
Rent, J. G. IIs, September 1st to October 1st	5,367	35 00	
Traveling expense, S. A. Sellers, October 8, 1887	5,364	7 80	
			250 20
<i>December, 1887.</i>			
Flags, R. H. Simon, preparing flags		\$138 25	
Office expense, Stetson & Adams, drayage	5,251	12 05	
Filature expense, B. Spence, reeler, Oct. 1st to Nov. 1st	6,422	20 00	
Rent, J. G. IIs, October 1 to November 1, 1887	6,419	35 00	
Filature expense, Mrs. L. Rienzi, silk expert, Oct. 1st to Nov. 1st	6,418	87 50	
Filature expense, G. Martin, reeler, October 1st to November 1st	6,423	15 00	
Filature expense, Martha Aspden, reeler, Oct. 1st to Nov. 1st	6,421	10 00	
Office expense, drayage, Stetson & Adams	6,417	16 75	
Office expense, Mrs. L. Rienzi		10 00	
Traveling expense, G. W. Carter, meeting November 5, 1887	6,416	20 80	
			365 35

THIRTY-NINTH FISCAL YEAR—Continued.

	Number Warrant	Amount.	Total Cash Paid Out.
<i>January, 1888.</i>			
Office expense, Mrs. L. Rienzi		\$15 00	
Filature expense, Georgina Martin, reeler, Nov. 1 to Dec. 1, 1887	7,561	15 00	
Filature expense, Bertha Spence, reeler, Nov. 1 to Dec. 1, 1887	7,563	20 00	
Filature expense, Mrs. L. Rienzi, silk expert, Nov. 1st to Dec. 1st	7,565	87 50	
Rent, J. G. IIs, November 1 to December 1, 1887	7,559	35 00	
Filature expense, S. Snook & Son, repairing pipes	7,566	8 80	
Office expense, Mrs. L. Rienzi		10 00	
Silkworm eggs, Albini Exchange on Paris		9 00	
Filature expense, Martha Aspden, reeler, Nov. 1 to Dec. 1, 1887	7,562	10 00	
Traveling expense, S. A. Sellers, meeting December 17, 1887	7,560	7 80	
Traveling expense, S. A. Sellers, meeting November 5, 1887	6,420	7 80	
Machinery, Oriental Warehouse, storage	7,567	2 00	
Filature expense, Mrs. L. Rienzi, instructress, Dec. 1 to Jan. 1		87 50	
			\$315 40
<i>February, 1888.</i>			
Office expense, Mrs. L. Rienzi		\$15 00	
Rent, J. G. IIs, December 1 to January 1, 1888		35 00	
Filature expense, Georgina Martin, reeler, Dec. 1st to Jan. 1st		15 00	
Filature expense, Bertha Spence, reeler, Dec. 1st to Jan. 1st		35 00	
Filature expense, Martha Aspden, reeler, Dec. 1st to Jan. 1st		10 00	
Office expense, Mrs. L. Rienzi		40 00	
Traveling expense, S. A. Sellers, January 21, 1888		7 80	
			157 80
<i>March, 1888.</i>			
Traveling expense, S. A. Sellers, February 18, 1888		\$7 80	
Filature expense, Martha Aspden, reeler, Jan. 1st to Feb. 1st		8 30	
Filature expense, Mrs. L. Rienzi, silk expert, Jan. 1st to Feb. 1st		87 50	
Filature expense, Bertha Spence, reeler, Jan. 1st to Feb. 1st		20 00	
Filature expense, Georgina Martin, reeler, Jan. 1st to Feb. 1st		15 00	
Rent, J. G. IIs, January 1 to February 1, 1888		35 00	
Machinery, moving and fitting up, Jos. Wagner & Co.		56 60	
Office expense, cleaning carpets		13 40	
Office expense, mulberry leaves, P. Reale		15 00	
Filature expense, Mrs. L. Rienzi, silk expert, Feb. 1st to Mar. 1st		87 50	
Rent, L. C. Fraser, April 1 to May 1, 1888		45 00	
Rent, L. C. Fraser, March 1 to April 1, 1888		45 00	
Office expense, Longley & Johnson, painting		2 00	
			438 10
<i>April, 1888.</i>			
Filature expense, Bertha Spence, reeler, Feb. 1st to Mar. 1st		\$40 00	
Filature expense, Georgina Martin, reeler, Feb. 1st to Mar. 12th		21 00	
Filature expense, Martha Aspden, reeler, Mar. 1st to Mar. 31		13 03	
Traveling expense, G. W. Carter, Mar. 31, 1888		20 80	
Filature expense, Mrs. L. Rienzi		140 00	
Rent, J. G. IIs, Feb. 1st to Mar. 1st		35 00	
Expenses, Mrs. L. Rienzi		35 00	
Office expense, G. Gianbroni, rubbish		8 00	
Office expense, C. W. Clark, window curtains		10 00	
Office expense, exchange, New York, Silk Exchange		7 93	
Office expense, exchange, Nellie Rossiter		3 60	
			334 42
<i>May, 1888.</i>			
Office expense, Mrs. L. Rienzi		\$10 00	
Rent, L. C. Fraser, May 1st to June 1st		45 00	
Office expense, Mrs. L. Rienzi		15 00	
Machinery expense, engine		27 00	
Machinery expense, fitting up engine, C. Rice		7 00	
Office expense, Mrs. L. Rienzi		15 00	
Silkworm eggs, exchange on Paris		28 00	
Office expense, Mrs. L. Rienzi		10 00	
Filature expense, G. Martin, reeler, April 1st to May 1st		15 00	
Filature expense, B. Spence, reeler, April 1st to May 1st		20 00	
			192 00

THIRTY-NINTH FISCAL YEAR—Continued.

	Number Worms.	Amount.	Total Cash Paid Out.
<i>June, 1888.</i>			
Traveling expense, S. A. Sellers, May 19, 1888		\$7 80	
Traveling expense, G. W. Carter, May 19, 1888		20 80	
Office expense, T. Barnard, coal		7 50	
Rent, L. C. Fraser, June 1st to July 1st		45 00	
Cocoons, Captain Mitchell		2 80	
Office expense, L. Rienzi		10 00	
Office expense, L. Rienzi		15 00	
Filature expense, B. Spence, reeler, May 1st to July 1st		40 00	
Cocoons, Lillie McCord		2 80	
Cocoons, Mrs. B. F. Olinger		40 05	
Cocoons, Miss H. S. Tower		11 60	
Cocoons, Mary Walker		7 00	
Cocoons, Edith Bowers		2 80	
Cocoons, Mrs. A. A. Inman		40 25	
Cocoons, Mrs. Herman		1 05	
Cocoons, M. L. Scannon		12 60	
Cocoons, Mrs. G. DeForce Cluff		12 40	
Cocoons, Mrs. J. B. Pressley		7 00	
Cocoons, M. Markarian		19 95	
Cocoons, S. E. Hathaway		31 50	
Cocoons, Miss Jane Dodd		65 10	
Cocoons, Mrs. George Fuller		63 80	
Cocoons, H. Glide		8 40	
Cocoons, Mrs. C. S. Babcock		30 80	
Cocoons, Mrs. Louis Nelson		16 80	
Cocoons, Ruddy Amherst		9 30	
Cocoons, Mrs. Smythe		1 40	
Cocoons, Miss Nellie Turner		82 85	
Cocoons, Mrs. P. R. Fanning		12 60	
Cocoons, Miss Wackenrender		6 75	
Cocoons, Mrs. M. A. Macklin		1 30	
Cocoons, Miss Lulu Sutphen		1 40	
			\$383 95
<i>July, 1888.</i>			
Office expense, Mrs. L. Rienzi		\$15 00	
Office expense, Mrs. L. Rienzi		10 00	
Filature expense, May J. Martin, May 1st to June 1st		10 00	
Traveling expense, S. A. Sellers, June 30, 1888		7 80	
Filature expense, G. Martin, reeler, May 12th to June 1st		10 95	
Filature expense, Mrs. L. Rienzi, instructress, May 1st to June 1st		87 50	
Filature expense, May J. Martin, reeler, June 1st to June 30th		10 00	
Traveling expense, S. A. Sellers, meeting, June 30th		7 80	
Office expense, Mrs. L. Rienzi		2 65	
Office expense, sundries, S. A. Sellers		5 10	
Filature expense, G. Martin, reeler, June 1st to June 30th		20 00	
Filature expense, Mrs. L. Rienzi, instructress, June 1st to June 30th		87 50	274 30
Total amount paid out			\$3,503 37
Received from State Controller		\$2,477 18	
Balance on hand, thirty-eighth fiscal year		301 60	
Received from Secretary for property sold		725 00	
Balance on hand			41
			\$3,503 78
			\$3,503 78

The above amounts are the total expenditures for the thirty-eighth and thirty-ninth fiscal years. I desire to state that there was not a sufficient appropriation for this Board during the thirty-ninth fiscal year. Having moved into larger quarters, our rent is greater, as also are other expenses. On account of the rapid increase of the business of this department, the sum of \$10,000 will be a small estimate for the

use of this Board for the coming two fiscal years, viz.: forty-first and forty-second. I desire to say that the limited funds at our command have been judiciously expended, as the above figures will show. Before closing, I desire to extend my warmest thanks to my colleagues for their uniform courtesy and regard to one who has been their Treasurer, and who has acted in that capacity for the best interests since the inception of this department.

Very respectfully submitted.

R. H. McDONALD, JR.,
Treasurer.

REPORT OF COMMITTEE ON MULBERRY TREES AND CUTTINGS.

As Chairman of the Committee on Mulberry Trees, etc., of the State Board of Silk Culture, I herewith present my brief annual report. The first step, and most essential one, for persons taking up the silk industry is to plant mulberry trees, the food of the silkworm. Although there are many mulberry trees growing in California, yet millions more ought to be planted. We do not encourage parties to plant the mulberry tree on land exclusively used for planting mulberry trees, but to plant them along the borders of the fields, on the avenues of roads, and when one hundred trees or more are planted they need very little care, and in a short time they will bear enough foliage to feed worms, the cocoons of which, when sold, will bring in a small revenue to each and every family rearing silkworms. California is peculiarly adapted to silk culture. It has the climate of Italy and Southern China and Japan, where silk is most produced. Therefore, we should plant the mulberry tree in every vacant spot where a tree would grow. The Supervisors of some counties have declared their intention to have the mulberry tree planted along the highways. This will be a great advantage to the silk industry, as the leaves could be gathered and fed to the worms. The mulberry tree bears two crops of leaves, so that the first crop of leaves could be given to the silkworms. Then the leaves would come out again, and the tree would be full of leaves during the hot season. The mulberry tree is as useful as well as an ornamental tree, and ought to be more freely planted.

The consignment of five thousand young mulberry trees, purchased by this State Board at Milan, Italy, arrived late in the season. All had long, tender sprouts on when they arrived. Those that lived have made a fine growth; they have large, glossy, firm leaves, and will undoubtedly make fine food for silkworms; they are of the cultivated cattaneo species, are said not to produce berries, and in that respect are superior to other varieties for feeding silkworms. We have sent trees (also cuttings of the Mons Alba variety) to the following names and addresses:

	Trees.	Cuttings.
Miss Leo A. Seymour, Santa Paula, Ventura County	50	100
Captain Mitchel, Antioch, Contra Costa County	25	100
F. Rogers, care Lichenberg, 303 California street, San Francisco.....	25	-----
P. B. Vinter, box 411, San José, California.....	25	100
Mrs. C. G. Wilson, Roseville, Placer County	25	100
Mrs. Isabella Harrison, Danville, Contra Costa County	25	100
Mrs. R. H. Wight, Cornwall Station, Contra Costa County	25	-----
A. Buttonbaugh, Brentwood, Contra Costa County	10	-----
G. Tallixson, Brentwood, Contra Costa County	10	-----
Mrs. S. Wills, Byron, Contra Costa County	10	-----
"Antioch Arbor Society," Antioch, Contra Costa County	50	-----
T. B. Dall, Livermore, Alameda County	25	100
J. M. Jumling, Newhall, Los Angeles County	25	100

	Trees.	Cuttings.
Mrs. James Goodwin, Petaluma, Sonoma County	25	-----
Mr. P. R. Klein, Calpella, Mendocino County	25	-----
D. H. Trout, Boulder Creek, Santa Cruz County	25	-----
Mr. G. T. Bartlett, Dutch Flat, Placer County	25	100
Miss Lizzie Rogers, 357 Center Street, San José	25	-----
Miss M. E. Lindsay, Eleventh Avenue and Sixteenth Street, East Oakland		100
Naelon Smith Burbank, Colfax, Placer County		50
Mrs. L. Perkins, Ben Lomond, Santa Cruz County		50
Ida M. Smith, Eureka, Humboldt County		50
Mrs. George Blake, Comptche, Mendocino County		50
Genevieve C. Booth, Hildreth, Fresno County		50
Mary Horn, San Rafael House, Marin County		50
Mrs. E. B. Morris, San Bernardino, San Bernardino County		50
Mrs. A. P. Johnson, College City, Colusa County		50
Dr. M. Penhod, Santa Barbara, Santa Barbara County		50
Mrs. C. P. Corbier, John Adams Post Office, Butte County		50
Mrs. H. H. Baneroff, 721 Market Street, San Francisco		100
H. C. Dohrs, Byron, Contra Costa County	25	100
John Gayette, Livermore, Alameda County	25	100
O. E. Hathaway, Sebastopol, Sonoma County	25	100
Miss H. S. Toner, Milton, Calaveras County	25	100
George Minville, Visalia, Tulare County	25	100
Colin Ross, Angwin, Napa County	25	100
Frank Kraft, St. Helena, Napa County	25	100
Miss Jennie King, Santa Cruz, Santa Cruz County	25	100
A. W. Peterson, Templeton, San Luis Obispo County	25	100
D. J. Farley, Los Gatos	25	100
Milton Shaggs, Brentwood, Contra Costa County	25	-----
State Board of Silk Culture, San Francisco	200	-----
J. C. Waterbury, Paso Robles, San Luis Obispo County	25	100
Adolph Brumen, 561 Tenth Street, Oakland, California	25	-----
A. S. Hewitt, Lugonia, San Bernardino County	25	100
Mrs. S. Nichols, M.D., El Cajon, San Diego County	25	100
E. White, Nelson, Butte County	25	100
Mrs. E. P. Maynard, Los Gatos, Santa Clara County	25	100
Mrs. E. J. Squires, San Mateo, San Mateo County	25	100
Peter A. Vielez, La Cañada, Los Angeles County	25	100
Samuel Slocombe, Paso Robles, San Luis Obispo County	25	100
Clifford Judge, Santa Barbara, Santa Barbara County	25	100
Mrs. Sarah M. A. Cowles, Compton, Los Angeles County	25	100
Miss Adin Bullard, Red Bluff, Tehama County	25	100
Miss S. D. Inman, St. Helena, Napa County	25	100
W. Gilbert, account of Gilbert & Moore, 18 Sutter St., San Francisco		100
J. Morton, Bradley Station		100
Mrs. S. A. McDevitt, 1439 Post Street, San Francisco		100
J. E. Norman, 116 California Street, San Francisco		100
H. M. Hough, 116 California Street, San Francisco		100
W. C. Leynde, 116 California Street, San Francisco		100
Albert Stone, Sonoma, Sonoma County		100
E. C. Fleming, Tubbs' Hotel, Oakland, Alameda County		100
Eliza Prydi, Paraguay Street, near Fourteenth Avenue		100
Geo. W. Kraft, Irvington, Alameda County		100
California Operative Colony, 426 Flower Street, Los Angeles		300
Miss Ira Cottle, San José, Santa Clara County		100
Mrs. C. Ahern, 316 Folsom Street, San Francisco		100
L. Malatesta, 2004 Dupont Street, San Francisco		100
Mrs. A. M. Morris, Stillwater, Shasta County		100
Mrs. H. E. Conger, Santa Cruz, Santa Cruz County		100
George R. Smith, Lancaster, Los Angeles County		100
George S. Irish, Elsinore, San Diego County		100
A. A. Bailey, Martinez, Contra Costa County		100
J. A. Bailey, Cornwall, Contra Costa County		100
Mrs. George Atkinson, San Rafael, Marin County		100
Mrs. C. Hasenbalg, Live Oak, Sutter County		100
Lila Forsythe, 240 North Fourth Street, San José		100
Mrs. Euzard, New Almaden, Santa Clara County		100
Mrs. C. E. Bengson, Napa Junction		100
Mrs. Mabel Horn, Pennsylvania House, Redding, Shasta County		100
A. Armstrong, Petaluma, California	25	100
J. R. Turley, Creston, San Luis Obispo County	25	100

	Trees.	Cuttings.
C. A. Bigelow, Atwater, Merced County	25	100
Elias Findley, Chico, Butte County	25	100
State Board of Silk Culture, San Francisco	200	400
State Board of Silk Culture, San Francisco	50	350
G. W. T. Carter, Fresno, Fresno County	500	-----
A. Mignon, Napa City, Napa County	25	100
Eula V. Scott, Fresno City, Fresno County	25	-----
Miss L. M. Jolly, Paraiso Springs, Monterey County	25	100
Henry Lang, St. Helena, Napa County	25	100
Mrs. E. A. Bateman, Anderson, Shasta County	50	200
Mrs. Pauline Vador, West Park Colony, Fresno County	50	-----
Seward Cole, box 1,371, Los Angeles, Los Angeles County	25	100
Mr. Charles D. Haven, 442 California Street, San Francisco	25	100
Mr. Fred. H. Busby, 412 Market Street, San Francisco	25	-----
Mrs. S. H. Murray, Jolon, Monterey County	25	100
George T. Folsom, San Mateo, San Mateo County	25	50
George W. Kraft, Irvington, Alameda County	25	100
Henry J. Solaro, 309 Clay Street, San Francisco	25	50
Mrs. J. B. Huber, 108 Walnut Avenue, Los Angeles	25	100
C. J. Beerstecher, 721 Market Street, San Francisco	-----	100
Mrs. Luis Mel, Livermore, Alameda County	25	50
E. Clark, Niles, Alameda County	25	100
Mrs. N. E. Johnston, Los Gatos, California	25	100

REPORT OF FILATURE COMMITTEE.

The Committee on Filature submits with great pleasure this, its fourth annual report:

In March, 1888, the office and filature were moved into more spacious and commodious quarters in rooms 91-92, Flood building, Fourth and Market Streets. As there is no motive power in the building the committee were obliged to purchase an engine to run the reeling machines. This engine is worked by means of steam power. This engine is not a new one, as there were not funds sufficient to purchase a new one, and at times there is great trouble arising from the engine getting out of order, leakage, etc. All the reels cannot work at one time, as the engine is not of sufficient capacity to drive shafting pulleys of same. Therefore, we beg that with the appropriation of the fortieth fiscal year a new engine of greater horse power be purchased.

The six reeling machines now used by this Board are of the most modern invention. The silk reeled on these machines can be put on the market at less cost than could be done with the old primitive reels, which have been in use in the United States up to the year 1886.

These automatic silk reels, purchased by this Board at a normal price, have an automatic batteuse, or brusher, whereby the ends of the cocoons are brushed up by means of revolving around in the basin where the cocoons are placed. This brusher has a reciprocating movement and revolves a certain number of revolutions and catches the ends of the cocoons. When the ends are brushed up, the brush stops automatically.

The advantage of this modern invention over the old method of brushing the ends of cocoons by hand is, that while by the method of brushing by hand girls would brush the cocoons with a heavy sweep of the brush and therefore waste a quantity of silk, they would also prolong the brushing until a great deal of reelable silk had been brushed up and wasted.

Then one of these batteuse can prepare the cocoons ready to supply two or more reelers, a saving of waste in silk and time, and allowing the reelers to feed on the ends of cocoons to the three or four skeins of silk they are winding on to the reels at one and the same time. These new reeling machines have a cap or covering over the reel where the silk is wound, which prevents the steam or moisture arising from the basin from affecting the silk on the reels, and, therefore, avoiding the ridges or gummy welts that have always been one drawback to our reeled silk. Samples of silk raised in California have been forwarded to silk manufacturers in New York and New Jersey, and we have received very flattering reports that our California raw silk is superior in quality, elasticity, and winding to the imported European silk.

The following pupils were taught the "Art of Reeling." A number came during the morning and afternoon, while others came all day. The filature was open from 9 A. M. to 4 P. M. According to the rules of the filature the pupils were required to give eight weeks' time at

reeling silk. At the termination of the eight weeks the pupils were examined in reeling, so that there should be a practical test of the proficiency of each pupil's progress:

Names of Pupils of the Filature.

Lillie Rice,
Theresa Peters,
Belle McLoud,
Clelia Hudson,
Annie Campbell,

Jessie Helm,
Martha Aspden,
Olivia Lamdini,
Fannie Lawton,
Julia Kelley,

Mrs. Cotton,
Mary Wharton,
Mary Martin,
Rose Wackenruder,
Josie Shuman.

The pupils of the South San Francisco School, accompanied by their Principal, Mr. W. W. Stone, paid a visit to the filature of this Board. The result of their observations is a neatly bound book, containing over two hundred papers of illustrated and written matter, on the subject of rearing silkworms and the reeling of same. This book was presented to this Board.

When our school children understand the method of rearing silkworms, and the reeling of same, it will be of great advantage to this State. Let the children make the rearing of the insect an amusement at first, and we shall soon see work supersede play; the work is light, pleasant, and remunerative; they can by this means earn enough money to clothe themselves, and to contribute to the general support of their families.

The committee have distributed, to interested parties, three thousand pamphlets on rearing silkworms.

We have received visits from the representatives of Japan, who are here studying the climate and industries of this country. Quite an interest is being taken by the sericulturists of Europe and Japan regarding the advantage of California climate for rearing silkworms.

Stock companies, organized for silk culture, always fail. In all its history, thus far, silk culture has defied corporations. Whenever they touch it to make money, they fail, but left to the intelligent and industrious women, as a home employment, it yields a generous reward.

Heretofore the rates of wages was such that parties did not undertake the smaller agricultural pursuits, such as silk culture. But since wages have become lower, people are adapting themselves to it, and considering that there is a small revenue to be had from rearing silkworms; so that with the rapid increase of the population of California, silk culture will be one of the sources of wealth for the State.

Respectfully submitted.

W. Z. PRICE,
Chairman.

REPORT OF COCOON COMMITTEE.

There is an increasing movement within the past year in the important work of rearing silkworms in California.

The following list will show the counties where silkworms are reared. The cocoons were purchased by this Board and the amounts paid set opposite each name.

Many of the cocoons were received in good order, others were too much stifled. In stifling cocoons great care should be taken not to put the cocoons under a temperature higher than 210 degrees Fahrenheit, and not to allow them to remain under said temperature longer than twelve minutes, as the cocoons might get scorched, and if improperly stifled the threads break in reeling, and therefore the cocoons are spoiled for reeling purposes.

There has been a sufficient quantity of cocoons raised in California during the season of 1888 to keep the filature running until the next crop comes in:

NAME.	Residence.	Amount Paid.
Mrs. C. S. Babcock	Fresno	\$147 55
Miss Nellie Robinson	Fresno	27 35
Mrs. B. Herman	San Francisco	13 12
M. A. Still	La Panza, San Luis Obispo County	1 00
Mrs. B. F. Olinger	Newcastle	5 60
Carrie McLead	Santa Ana	6 47
Mrs. C. L. Perry	Los Angeles County	6 95
Miss May Gesford	Napa City	23 80
Joe Ebner	Sacramento	3 15
Mamie Stone	San Lorenzo	1 75
Mrs. S. A. Sellers	Brentwood	22 40
Mrs. A. A. Inman	St. Helena	29 95
Mrs. A. Scheggia	Rutherford, Napa County	13 65
Miss Nellie Turner	Amador City	24 25
L. A. Pressley	Santa Rosa	9 34
B. H. Carter	Oakland	2 20
Mrs. B. F. Olinger	Newcastle	80
Mary Wint .....	.....	1 05
Mrs. M. H. Bryan	Santa Ana	6 60
B. H. Carter	Oakland	11 35
Hilda Aderell	Marin County	4 20
J. H. Marshall	Marin County	9 90
M. M. Gallado	Mission San José	5 95
Ella L. Kelley .....	.....	4 65
Annie E. Legan .....	.....	7 00
Mrs. William Knight .....	.....	10 85
George Hinde	Sacramento	90
Mrs. T. M. Wells	Santa Ana	21 00
Mrs. H. S. Foote .....	.....	2 15
Mrs. La Montague .....	.....	3 85
M. M. Gallado	Mission San José	5 60
Women's Exchange	San Francisco	1 40
Miss Lulu Sutphen	Santa Cruz	3 85
Mrs. A. D. Wardrobe	Lodi	5 00
Wintie Brodt	San Francisco	1 00
Mrs. S. A. Sellers	Brentwood	26 90
Mrs. A. A. Inman	St. Helena	33 90
Mrs. A. D. Wardrobe	Lodi	18 13

NAME.	Residence.	Amount Paid.
Lizzie Cakebread	Brentwood	\$5 60
Mrs. T. M. Wells	Santa Ana	17 05
Fannie Cole	Corral, Nevada County	5 80
Mrs. La Montague .....	.....	2 80
Captain Mitchell	Antioch	2 80
M. L. Scannon	Alameda	12 60
Mrs. G. DeForce Cluff	Lodi	12 40
Mrs. J. B. Pressley	Santa Rosa	7 00
M. MacKarian	Fresno	19 95
S. E. Hathaway	Sebastopol	31 50
Jane Dodd	St. Helena	65 10
Mrs. George Fuller	Fresno	63 80
Mrs. Herman	San Francisco	1 05
Miss Lulu Sutphen	Santa Cruz	1 40
H. Glide	Sacramento	8 40
Mrs. C. S. Babcock	Fresno	30 80
Ready Armhurst	Lodi	9 30
Mrs. B. F. Olinger	Newcastle	40 65
Miss H. S. Tower	Milton	11 60
Mary Walker	St. Helena	7 00
Edith Bowers	St. Helena	2 80
Mrs. A. A. Inman	St. Helena	40 25
Mrs. Louise Nelson	Fresno	16 80
Mrs. P. R. Fanning	Fresno	12 60
Lillie McCord	St. Helena	2 80
Miss Nellie Turner	Amador City	82 85
Mrs. Smythe	Oakland	1 40
Miss Wackenreuder	San Bruno Road, San Francisco	6 75
Mrs. M. A. Macklin	Drytown, Amador	1 30
C. A. Bengson .....	.....	4 40
B. H. Carter	Oakland	3 05
Total amount paid .....	.....	\$1,055 55

STATISTICS OF SILK.

The seric industry is one of the principal industries in Syria. It is cultivated in Libano, Beiruth, and Tripoli. The total production of fresh or green cocoons is about two million to two million and a half pounds. The silkworm eggs used in Syria come from Japan. In Libano, as in other silk districts, the white mulberry is the principal one cultivated for food for silkworms. The trees are planted from nine to twelve feet apart, and the soil is cultivated three or four times a year. The silk industry is in the hands of the French people. Many silk manufacturers of France have their representatives in Libano, Beiruth, and Tripoli, and these representatives send the cocoons to France to be manufactured there.

In Italy the silk product of this year has been inferior, in quantity as well as quality, to that of last year, amounting to about ninety million pounds, against ninety-eight million pounds in 1887. These eight million pounds less, are equal to six hundred and eighty or six hundred and seventy-five pounds of raw silk.

In the Orient the product of cocoons was even less favorable. Meanwhile it was believed that the product of Japanese cocoons would be greater this year than that of the past year, but it is inferior by six thousand seven hundred and fifty bales.

In China the silk product is held to be greater than that of Japan, yet it is five thousand bales less than the product of 1887. It is calculated that the actual stock of raw silk now in Europe amounts to two million six hundred and fifty-five thousand pounds less than that of last year. For example, the stock of raw silk in Lyons on June 30, 1888, was one million three hundred and seventy-eight thousand and thirty-eight pounds; on June 30, 1887, it was three million four hundred and ten thousand and three pounds, and on June 30, 1886, three million thirty-nine thousand three hundred and forty-two pounds.

The cocoon product in Bengal and Syria is two thousand bales less than that of last year. The stock of raw silk on hand in Japan, June 30, 1888, is five thousand bales less than that of 1887.

To sum up, results that the cocoon product of the present year is less twenty-two thousand bales in the Orient and Asia, or two million nine hundred and seventy thousand pounds of raw silk less than that of last year. Adding these two million nine hundred and seventy thousand pounds to the above two million six hundred and fifty thousand pounds, and we have five million six hundred and twenty thousand pounds less of raw silk this year, notwithstanding that the consumption of raw silk has increased about two million two hundred and fifty thousand pounds.

INTERESTING REPORT FROM EUROPE.

The State Board of Silk Culture's special agent in Europe, Hon. Horace J. Smith, sends the following interesting summary of his observations in Italy, France, and elsewhere, in respect to the industry of silk culture as practiced in those countries:

In France and Italy a traveler interested in questions concerning silk comes to look upon the matter in a way different from anything that is possible in the United States. In America the question of sericulture partakes of that unrich character which marks everything relating to the future, and its importance can only be appreciated by those whom the world in general calls enthusiastic and visionaries; but in France and Italy it is one of the great and stable industries of the country, and in many and large districts it is chief among these. There is nothing visionary about it, nothing indefinite, nothing that has not been studied carefully and thoroughly. Silk raising, cocoons, silkworm diseases and their remedies, reeling, and all the important questions relating to the industry, are as commonly discussed and as familiarly brought forward to one's attention everywhere as are crops, cattle, agriculture, and trade generally at home. No one can become familiar with Southern France and Northern Italy without being impressed with the immense value of sericulture; nor can any intelligent person doubt the truth of two things: First, that the industry is well worth any efforts necessary to increase it, and secondly, that its introduction must be a process of some difficulty, requiring energy, patience, intelligence, and organization on the part of those who undertake to promote it. I have, therefore, since I came abroad, learned to take a very large view of the importance of the work which the California State Board of Silk Culture has in hand. I have seen enough to convince me that the obstacles to be overcome are far from trifling, and what I have seen has filled me also with the conviction that, if properly carried out, the work of the Board will add an element to the public wealth of California of greater importance than ever the most sanguine enthusiasts at home have dreamed of. Sericulture is eminently an industry calculated to spread comfort and well-being among the people; it is everywhere carried on in the homes of the farming population; in its very nature it is a home industry. Nevertheless, it has in course of time become so thoroughly organized in Europe that America, in order to compete, must go to work in a very careful and complete manner. If this is done, there can be no doubt of success; and I see no reason to doubt our ability to appreciate whatever is good and suitable for our circumstances in the European organization of the work, nor to doubt that many of the difficulties which surround sericulture in Europe will be found to be absent in America. In short, there is every reason to believe that, with proper management, the result of the labors of the Board will be everything that has been hoped for.

I would earnestly recommend that the Board conform as closely as possible to the suggestions hereinafter contained, as I am convinced

that by so doing many troubles will be avoided and a commercial success reached much more promptly and economically than would otherwise be the case.

SEED.

No means exist by which any one can tell from the inspection of the seed (eggs) itself whether it is sound or diseased.

A certain lot of eggs from diseased worms, and of which the product will show them to be diseased, cannot be distinguished by the greatest expert from another lot coming from the best possible sources. The Pasteur system is not based upon an examination of the eggs themselves, but upon examination of the bodies of the insects which have laid the eggs; and the only guarantee of the purchaser of silkworm seed is the reputation for honesty and good faith of the seller. In Europe there are many professional dealers in silkworm eggs, some of them having a very high reputation. There are also associations and syndicates of proprietors and reelers, who interest themselves especially in the distribution of sound seed.

In California I would suggest that this work be, for the present, undertaken by the Board. The following is an outline of the process adopted by the best raisers of seed in Europe:

The process begins with the purchase of the best eggs procurable, and their distribution in small lots among a considerable number of silkworm raisers. As a rule, not more than one ounce of seed should be confided to any one person, nor should a quantity of worms greater than that produced from one ounce of seed be raised in any one building. Nevertheless, it is advantageous, for reasons that will appear later on, to have as many raisers as possible in the same village or neighborhood.

When the worms are hatched, a record is kept of each separate lot, and an inspector is appointed to visit them all day by day, and to enter in a book a record of their growth and development. Worms which show irregularities of growth, feebleness, tendency to disease, or other undesirable qualities, are immediately checked off from the list of reproducers, and their cocoons are afterwards sold, to be reeled, and not to be used for breeding purposes. A rule is made, and strictly adhered to, that worms bred for reproducing purposes shall not be fed from very young mulberry trees, or from trees which have been cut back the year before. When the worms have formed their cocoons, and the latter have been taken from the brush, they are strictly examined. The lots which present any irregularities of color, weight, size, texture, or quality, are checked off from the list of reproducers and sold for reeling. In those lots which are found to be uniform and of first rate quality, the cocoons are carefully sorted, and all doubles, light weight cocoons, those which are misshapen, stained, or defective in any way, are sent to be stifled and reeled. The best are strung upon thread to be used for reproduction.

When the insects emerge from the cocoons, any which are found to be deformed or weak are immediately destroyed. Those which are sound and vigorous are put together in couples, male and female, and each couple is put into a little box or cell by itself.

The method of making the boxes or cells varies very much. In some cases simply a little bag of light netting (like mosquito netting) is used, about three inches square. In other cases a box is provided, divided off into compartments about two and a half inches square,

and about an inch deep. Each female deposits her eggs in the cell in which she has been confined, and soon afterwards dies. Then, as soon as possible, the bodies are taken, pair by pair, and bruised in a small mortar. The part of the mass coming from each pair is then put into a microscope slide and examined. If any corpuscles indicating a tendency to hereditary disease are found, the eggs coming from that pair of insects are at once burned; but the eggs coming from the insects which have been found by this examination to be healthy, are preserved for the production of the next year's crop.

This is an outline of the Pasteur process. At first sight it appears very tedious and complicated; and it really requires a great deal of care and pains. If properly organized, the examination can be carried on very rapidly and naturally, the larger the number of the insects to be examined the better will be the organization, and the more certain and economical the result.

In France, many of the "graineurs" (that is to say, raisers of seed), having realized large fortunes from the exploitations of this process, and having established the value of their brands, have become very much less careful than they formerly were, and now, in many cases, only examine a part of the insects, instead of submitting them all to the test. This has many times resulted in disasters, and a breaking out of the disease in places where it was supposed to have been thoroughly overcome. These men have also been guilty of selling to speculators the eggs which they had found by examination to be diseased; and such eggs, sold at a low price to raisers, have naturally given very bad results. I cannot too earnestly recommend the Board to submit to any inconvenience, and take any pains which may be necessary to secure thoroughly good and sound seed, and I am sure that such care will, in a short time, be richly rewarded.

WINTERING.

The eggs should be preserved through the winter in a cool, well-aired place, and thoroughly protected from rats and mice. In France and Italy there exist large establishments especially adapted to the conservation of these eggs during the winter. I do not doubt that the Board has sufficient information to enable it to attend to this point, and would only say that it should never be neglected.

DISTRIBUTION OF SEED.

Silkworm eggs should not be transported so late in the season as to risk their hatching while on their voyage. Very many valuable lots have been entirely lost in this way. The Board would do well to refuse to fill any orders, or supply any seed, after the middle of the winter, except for parties in the immediate neighborhood of the central source of supply.

REARING.

I do not find much to add to the manuals of silk raising already in the possession of the Board; and concerning the rearing, have only to remark, that plenty of space, fresh air, a constant and considerable temperature, regular and sufficient feeding, the immediate removal of all diseased worms, cleanliness, and constant attention, are the chief requisites. As a detail, it may be noted that light, ribbon-like

shavings answers extremely well for brush to be supplied to the worms for forming their cocoons. The shavings are not easily procurable in Europe as in America, because very little wood is used in construction; but in California it will probably be found more economical and advantageous to use them than to procure and place the common kinds of brush, as has been done here. The shavings should be in long loose curls and should be placed between the worms in sufficient quantity to enable them to find places for making their cocoons without crowding each other. A system of feeding worms with entire branches of trees, and of changing these branches by means of movable shelves, is coming into practice in some places in France and Italy. It is said to work very well, but I have had no opportunity of examining it.

There is another detail in connection with the feeding, which will probably be found of practical utility. It is the manipulation of chopping the leaves for the young worms. This is a laborious operation if not properly carried on, but with the help of a very simple apparatus can be quickly and easily performed.

The apparatus consists of a knife, like a large, heavy, carving-knife, attached by a screw joint at its point to a piece of heavy board of about fourteen to sixteen inches. The point of the knife should be attached at one side of the board, at the middle of its length, and should be so arranged that the handle being grasped, the knife can be raised and lowered, and swung to one side or other, and that when the handle is pressed down, the edge of the blade of the knife shall rest upon the plank. In placing an apparatus of this kind on the table or floor, the operator takes a handful of leaves to be chopped, places it on the board, and cuts it through the middle by depressing the knife. The two halves are then put to the left of the knife, one above the other, in such a way as to present all the cut edges toward the knife, that is to say, the part of the leaves which was at the right of the knife is turned over and put on top, and then with the part which was at the left in the beginning. Now, by taking this pile of leaves with the left hand, the operator seizes and raises the knife with the right hand, pushes the edge of cut leaves somewhat under the knife, and depresses the latter, thus cutting off a slice of chopped leaves. The knife is then swept to the side, clearing the board, and the operation is repeated. In this way a rapid, easy, and uniform cutting of the leaves is secured.

FOOD.

The common wild mulberry trees furnish a most excellent food, and is equal in every way to the best qualities of grafted trees, except that it requires more labor to gather the leaves. The management of a mulberry plantation is as follows:

The trees are placed about thirty feet apart both ways, and are cut so as to preserve a crown about six or eight feet from the ground. The shoots from this crown form long slender twigs or boughs, which can be easily stripped of their leaves. In gathering the leaves an apron is worn, which is formed into a large bag. The operator, by means of a short ladder, climbs the tree, takes each twig or bough at its base, and strips all its leaves with one motion of the hand and arm. It may be noted in passing, as a curious fact, that in general the mulberry trees of France and Italy are stripped twice in the

year; first, during the silkworm season, to furnish food for the cocoons; and again, just before the leaves fall.

The leaves gathered in the autumn serve as winter food for sheep.

I would earnestly suggest that the Board propagate and furnish, or at any rate recommend, mulberry trees as the only proper food for the silkworm. I am aware that cocoons of fair appearance can be produced from worms fed upon lettuce and osage orange, that is, with osage orange and some other plant; but experiments made this year in France from cocoons so fed, show that they find at least twenty-five per cent less silk than those fed upon mulberry.

DECOCONNAGE.

(Gathering Cocoons from the brush.) In gathering the cocoons from the brush, great care should be had not to pinch or bruise them, as this often results in staining and injuring good cocoons.

STIFLING.

This is a subject to which attention should at once be given by the Board. Cocoons of the best quality may be very much injured by unskillful stifling. In France and Italy, the reelers do not allow the producers to stifle their own cocoons, but buy them alive, and have them stifled in their own establishment, by steam or hot-air furnaces especially constructed for the purpose, and managed by very skillful men. If the cocoons are improperly stifled, they do not yield their thread properly in reeling, and the result is a very inferior silk. I am told that one of the best furnaces for stifling is built by Mr. Varielles, at Crest, in the Department of the Drome, but that it requires a good deal of skill to run it. I hope to be able to procure for the Board a set of drawings for stifling furnaces, together with the instructions for their use.

DISPOSAL OF INFERIOR COCOONS.

As soon as the cocoons have been stifled they should be sorted, and all doubles should be taken out and sold to be carded. Stained, feeble, and defective cocoons should be reeled at once, as they can be handled better when fresh than after they become dry.

DRYING.

In France and Italy every filature is provided with a large loft for storing and drying cocoons. This is called the "coconniere," or cocoon-house. It should be constructed in such a manner that the prevailing winds will sweep through the windows, which should open on either side of the loft. The cocoons are put, when fresh, in layers of not more than six or eight inches deep, and should, in the beginning, be turned over every day. In Europe it requires from two and a half to three months to thoroughly dry the cocoons; but in the drier air of our summers the desiccation will probably be found to take place much more rapidly.

The "cocoeneries" usually have large rocks placed one above another, about two feet apart. They are about four feet wide, and arranged with passages between them, so that women can easily reach the cocoons to turn them over. This is done with a sort of light

wooden paddle, which should be made very smooth on the edges, and free from splinters, so as not to damage the cocoons.

REELING.

The isolated hand-reel is essentially a thing of the past in the civilized parts of Europe, even in the districts where women may still be seen using the distaff and spinning-wheel. The reeling of silk has become a factory operation, and is carried on in establishments employing from seventy-five to four hundred or five hundred hands. The fact is, that the cocoon is too valuable to be sacrificed to the irregularities and want of system inevitably connected with unorganized manufacturing purposes.

The machines generally employed for reeling do not differ very much from the hand-reel, except that the basin is heated by steam and the reels are turned by power. In the organization of the filature, the presence of skilled inspectors, the increased excellence arising from constant employment of women at this one thing, and the advantages in a commercial sense of large establishments, have produced economies with which the old hand-reel system cannot compete. In America it would be suicidal to undertake to reel silk by isolated hand-reels; the value of the product is immensely affected by the reeling, and it would never pay to carry it on except under the best circumstances.

As is well known to the Board, the want of automatic machinery for reeling silk has been the great difficulty in the way of the introduction and development of sericulture in America. This difficulty has been overcome. Mr. Serrell has his automatic reels in constant and successful operation. The value of his inventions is estimated at very large figures by their proprietors, and he is constantly building new basins as rapidly as possible. The Academy of Science of Lyons gave him last summer its great gold medal for the most valuable invention to the silk industries of France. This medal is a prize established by Prince Lebrun in the eighteenth century, and has never before been awarded to any foreigner. Mr. Serrell has as his associates a number of the most prominent and successful silk men of Europe—men every one of whom is a magnate, and almost a prince, in his own part of the country; but he is an American, and has told me that the object and aim of his work continues to be what it was when he began it seven years ago, namely, the production of machinery which should make possible and profitable the reeling of silk in the United States. His sojourn in Europe is daily resulting in the increase of his practical knowledge of this subject, in the future development and perfection of his machinery, and the amassing of the considerable amount of capital he feels to be necessary to a successful start at home. There can be no doubt whatever that this problem has been solved. It will take some years to develop and organize sericulture in California. Long before this can be done, reeling factories, with automatic machinery, will undoubtedly be established and ready to take the cocoons. In fact, Mr. Serrell tells me that he expects to start in California, and to import at least a part of his cocoons for some years.

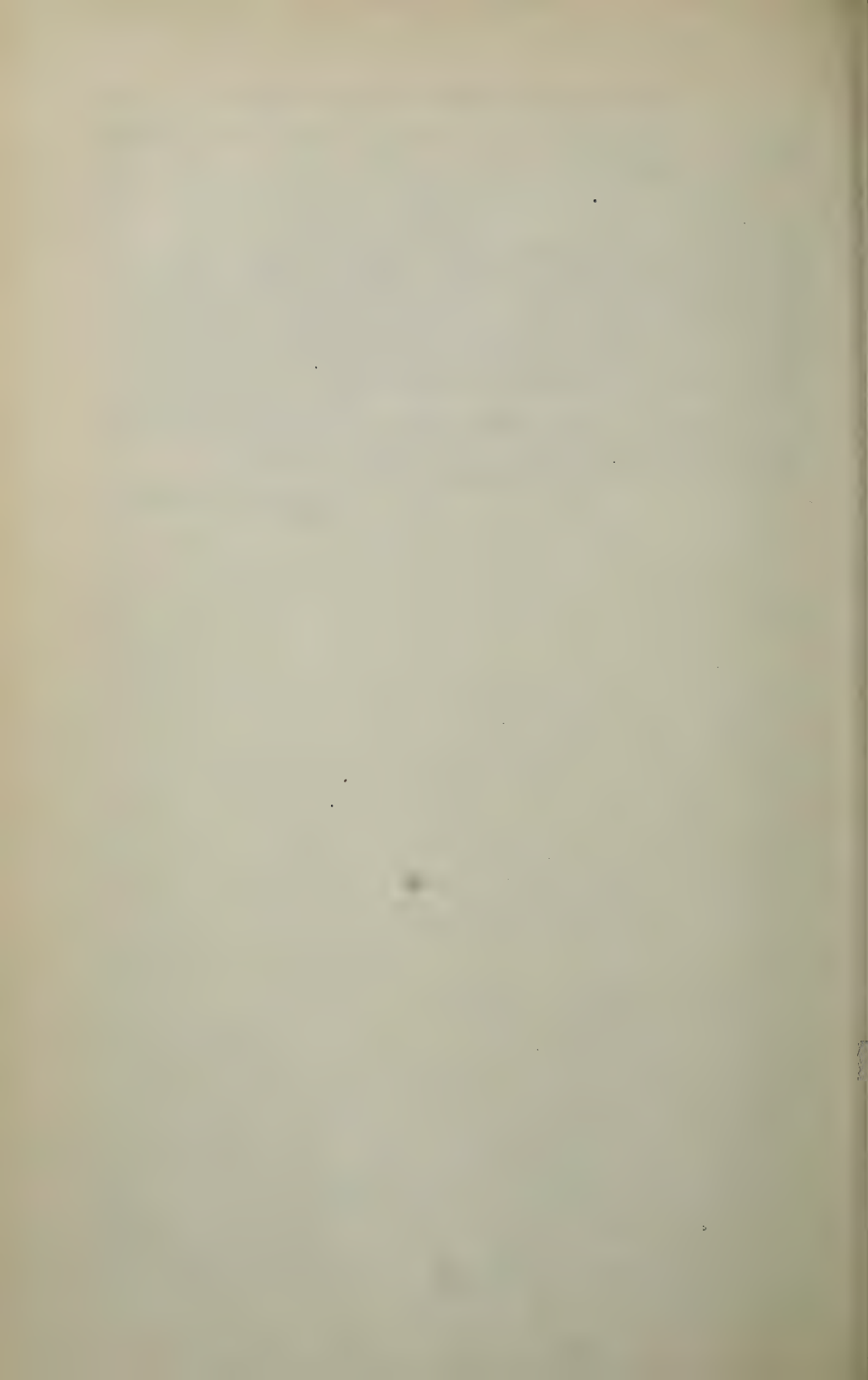
A reeling factory of very ordinary capacity requires at least one hundred thousand pounds of cocoons per annum; it is therefore evi-

dent that a sale for the product of the labors of our sericulturists will not be wanting.

I cannot conclude this report without reiterating my conviction that America, and especially California, has natural advantages for sericulture so great that, understood and utilized with the energy characteristic of our people, the result will be that a leading place among silk-producing countries will be rapidly attained. It is within our power to exercise the discretion which has marked our national and industrial development, to appropriate those things which have been found to be good in the experience of others, to start without the hampering traditions and habits of other countries, to organize in the best manner, to develop with the greatest rapidity, and to distribute among our people sums of money which are now sent abroad every year, amounting to many million dollars. This prospect will, I have no doubt, encourage the Board to unremitting activity, and the result of their labors will be lasting and beneficial to the State.

Very respectfully,

HORACE J. SMITH.



THIRD BIENNIAL REPORT
OF THE
BUREAU OF LABOR STATISTICS
OF THE
STATE OF CALIFORNIA,
FOR THE
YEARS 1887—1888.

JOHN J. TOBIN, COMMISSIONER.



SACRAMENTO:
STATE OFFICE, : : : J. D. YOUNG, SUPT. STATE PRINTING.
1888.



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STATE BUREAU OF LABOR STATISTICS, }
SAN FRANCISCO, October 1, 1888. }

To his Excellency R. W. WATERMAN, Governor of California:

SIR: In accordance with law, I have the honor to submit herewith the report of this bureau for the years 1887 and 1888, being the third biennial report.

Very respectfully yours,

JOHN J. TOBIN, Commissioner.



PART I.

INTRODUCTION.

CHAPTER I.

COLLECTING STATISTICS BY MAIL.

In presenting the third biennial report of the Bureau of Labor Statistics I take the liberty, in the first place, of submitting a few suggestions regarding the law by which it was established, with a view to its amendment. Section four of said law makes it "the duty of all officers of State departments, and the Assessors of various counties of the State, to furnish, upon the written request of the Commissioner, all the information in their power necessary to assist in carrying out the objects of this Act." The framers of this law took it for granted, seemingly, that industrial statistics were to be collected chiefly through correspondence with State and county officials.

Therefore they did not provide the means or machinery for other methods of collecting them. Experience has shown that the Assessors of the various counties will not furnish information "upon the written request of the Commissioner."

The blanks sent to them are in nine cases out of ten never returned. No person, but especially a public official, is expected to do extra work without compensation. The law being silent upon this important point, county officials locked up their information.

A very pointed and convincing illustration of this fact was given to me in my first attempt to get information from county officials. A circular, approved by Governor Bartlett, who took a deep interest in the question of manual training, was sent to the Superintendents of Schools in each county of the State, asking the following questions:

First—What is the number of school children in your county, according to the last school census?

Second—What, in your opinion, are the relative percentages of pupils in your county who study for the learned professions, clerical and commercial pursuits, agriculture, mining, and mechanical industries or trades?

Third—What are the facilities, if any, for a boy or girl learning a trade in your county?

Fourth—Do you favor manual or technical training as a part of the public school system of this State?

Fifth—What should be the scope or extent of this training?

Sixth—What particular branches of technical knowledge would you deem best for the interests of your section of the State?

Seventh—Do you favor an apprenticeship law, and for what reason?

Eighth—Are skilled mechanics in your county, such as are engaged in watch making, gold, silver, and jewelry work, engraving, lithographing, wood cutting and carving, ornamental painting, decorating, and other high grades of mechanical labor, of American or foreign birth?

Hoping that you will favor me with a reply at your earliest convenience, I have the honor to remain,

Yours respectfully,

JOHN J. TOBIN, Commissioner.

It was the first time County School Superintendents had been asked for any information on the part of the Bureau of Labor Statistics. The ques-

tions were few and simple, and would not take much time or labor to answer. I flattered myself that from an educated body of men, having the welfare of youth at heart, and on a matter of such momentous importance in the direct line of their vocation, responses would come from almost every one of the fifty-two counties in the State.

Never was man more deceived and disappointed than I was, for only twelve, or 23 per cent, of the Superintendents sent replies. To make certain of some kind of an acknowledgment of the receipt of the circular sent by the bureau, return stamped envelopes were inclosed in every case. The name of the Superintendents from whom replies were received will be found in another part of this report.

It is a fact, now well established, that the attempt to collect statistics by mail has proved a failure in every State where it has been tried. Yet this was the only means by which this bureau could expect to gather statistics outside of San Francisco and its environs. The law allows only \$500 per annum to pay all the contingent expenses of the bureau—postage, stationery, lights, fuel, janitor, traveling expenses, etc. Consequently I had no means to defray my own expenses or that of my deputy or of an agent in gathering statistics throughout the State. Of the thousands of blank "forms" mailed to every part of California, asking for information, not 10 per cent were returned. The preparation of these "forms" involved much time and labor, and their printing and mailing were of considerable expense to the State. A perusal of them will show that a vast amount of valuable statistical information was sought for. The result was lamentable failure, but a failure in some degree anticipated, as my circular to the newspapers (Circular No. 2) will demonstrate. The question naturally arises, Why should people refuse to furnish such data? My experience is similar to that of Commissioner Peck, of New York, who says:

"For various reasons people have failed to respond to the inquiries sent out by Commissioners. Employers have refused to answer because they believed the Labor Bureau was created for the purpose of arbitrarily prying into the conduct of their business in the interest of discontented workmen. Employés feared to answer through an apprehension that it would displease their employers and thus hurt themselves. Farmers declined to respond through a suspicion that it was a covert scheme to obtain valuation of their lands and revenue with a view to increase taxation."

Some refused because they thought they could not be compelled to answer, and many because they could not understand what benefit could be derived from furnishing the required facts.

The great majority, however, refused to respond through sheer neglect or indifference. In most of the Eastern States where Labor Bureaus have been long established and their work appreciated, distributing blank "forms" through the mail, having been found ineffectual, has been, to a great extent, discarded, and they now depend almost entirely upon work done by salaried agents. Personal inspection and interrogation by the Commissioner, or his authorized representative, is the only and proper way to obtain full, fresh, intelligent, and correct statistics. This cannot be done without an increase in the appropriation for contingent expenses, including hire of one or two agents.

The first bill introduced into the Legislature of this State to establish a Bureau of Labor Statistics, which failed to become the law, appropriated \$15,000 for its support. Most of the Eastern States make liberal provision for their Bureaus of Labor. In fourteen years, from 1870 to 1884, Massachusetts spent \$193,727 12 on her Labor Bureau, and appropriates annually

\$6,500 for contingent expenses; New York, \$6,700; Michigan, \$6,500; New Jersey, \$4,200, and so on. California, with its immense area and vast industrial resources, should make an appropriation for her Bureau of Labor Statistics commensurate with her rank and importance as a field for industry and enterprise.

IMPORTANCE OF ANNUAL REPORTS.

The importance of an annual inquiry into and report upon the manufacturing industries of the State cannot be over-estimated. California has made her mark in three great fields of industry: 1. Mining. 2. Agriculture. 3. Horticulture and Viticulture. She has now entered the race as a great manufacturing center, and her progress in this should be carefully watched and noted. It is especially the province of this bureau to perform this duty; but it cannot be done without the coöperation of the manufacturers themselves. Those who appreciate the objects sought to be attained in publishing statistics relating to our manufacturing industries—men of broad, intelligent views—readily answer all inquiries. They are generally the heads of our largest establishments.

DIFFICULTIES IN COLLECTING STATISTICS.

But many men are so narrow-minded, and so ignorant of the ends in view, that they will not supply the information unless upon compulsion. They think it is an illegitimate inquiry into their private affairs, and resent it with as much acerbity as the ignorant housewife did the inquiries of the first census taker. It is of no use to point out to such people that all the blanks sent to them are marked on their face, "strictly confidential;" "no names will be mentioned in reports;" "blanks destroyed after being used," etc.

Besides such assurances on the *face*, there was also printed on the *back* of manufacturers' blanks the following emphatic pledge:

Lest there should be any apprehension on the part of employers that answering any of the questions in this blank "form" may be prejudicial to their personal or business interests, the Commissioner desires it to be distinctly understood that the bureau will preserve the strictest confidence with all supplying information. The statistics collected by the investigation will be classified and grouped in *totals*, and no names of persons, employers, or employes, except by express permission, will appear in the report, or be otherwise given to the public.

To obviate the difficulties thus met with in collecting statistics, a committee of three Labor Commissioners—Carroll D. Wright, Massachusetts; James Bishop, New Jersey; Charles F. Peck, New York—drafted the following bill for submission to the various Legislatures:

AN ACT TO FACILITATE THE COLLECTION OF STATISTICAL DATA OF THE PRODUCTIVE INDUSTRIES OF THE STATE.

The People of the State, represented in Senate and Assembly, do enact as follows:

SECTION 1. It shall be the duty of every owner, operator, manager, or lessee of any mine, factory, warehouse, elevator, foundry, or machine shop, or other manufacturing establishment doing business in this State, to report annually, on the first day of —, to the Commissioner of the Bureau of Labor, the name of firm or corporation; where located; the class and value of goods manufactured yearly; the number of weeks in operation; the cost of buildings and grounds; the cost of machinery and repairs; the amount paid yearly for rent, taxes, and insurance; the value of raw material used yearly; the total amount of wages paid yearly; the total number of employes (male and female); and the highest and lowest wages paid skilled and unskilled male and female employes.

Sec. 2. The Commissioner of the Bureau of Statistics of Labor is hereby authorized to furnish suitable blanks to the owner, operator, manager, or lessee of any mine, factory,

workshop, warehouse, elevator, foundry, machine shop, or any other manufacturing establishment, to enable said owner, operator, manager, or lessee to intelligently comply with the provisions of Section 1 of this Act; and any such owner, operator, manager, or lessee who shall willfully neglect or refuse to comply with the provisions of this Act shall be deemed guilty of a misdemeanor, and on conviction thereof shall be punished by a fine of not less than one hundred or more than two hundred dollars.

SEC. 3. This Act shall take effect immediately.

This bill, or one similar in substance, is now the law in several States. Governor Robinson, of Massachusetts, was so favorably impressed with the expediency of such a measure that he referred to it in his message to the Legislature, as follows:

I need hardly remind the Legislature of this State that if such a bill could be passed, its results would be of almost incalculable value, not only to the people of our State, but likewise to those of the whole United States and foreign countries as well. I cannot conceive of any sound or reasonable objection to the enactment of this bill on the part of that class of our people directly affected by its provisions, when its full scope and intent are clearly understood. I can readily understand how a manufacturer, at first thought, might urge in opposition to the passage of the measure that the information sought was of too inquisitorial a nature. But a more careful study of the real scope and nature of the series of questions asked will demonstrate that such objection will not hold good, for the reason that all data collected by such means will be classified and grouped in *totals*, and no names (except by express permission) would appear in the reports or otherwise be given to the public. The result and value to be gained by an annual exhibit of this class of statistics, which would necessarily result from the enactment of such a law, cannot be over-estimated. It would furnish an amount and character of data that would be of equal benefit to capital and labor—a solid basis of facts upon which alone intelligent legislation could be perfected.

I cannot too strongly urge upon the attention of the Legislature the absolute necessity of passing such a law. Without it all attempts to gather complete statistics relating to our manufacturing industries will be futile. Not only all the countries should be heard from, but the manufacturing industries in every county should be heard from also. Unlimited authority to inquire into the business affairs of the people, and to demand answers, with the alternative of a penalty, should not be vested in any individual, nor is it desired or asked for by the bureau. Blank forms would be prepared, which should be unobjectionable to manufacturers, yet which when properly filled out and tabulated with other of similar character would convey valuable information. After a year or two reports founded upon such data as these would be of such general interest that the system would commend itself, and no further trouble would be experienced in getting the facts.

As pertinent to the foregoing, and putting in a clear, pointed manner the futility of sending out blanks under the old system, minus the power of compelling truthful answers, the following editorial from one of the San Francisco papers deserves attention:

With regard to the blanks sent to us by the Commissioner of the Bureau of Labor Statistics, we have to say that we have glanced over them. They are very carefully prepared. They have been printed fairly well. They are very complete, including many lines of inquiry—and they are of no more value than other pieces of wasted paper. What can the Commissioner hope to do towards accomplishing any fraction or iota of the purposes which the promoters of the bill to establish the bureau designed it to accomplish?

Answers cannot be enforced. There is no way of compelling an answer, no means provided for inquiring into the truthfulness of the answers, without which the measure must be useless. So far are we from blaming the Commissioner for the uselessness of the system that we assure him that we would rather have the results of his own personal investigation (exactly stating everything which he could find out, even in regard to one business, trade, or occupation) than ten thousand pages of the most correctly ciphered compilations based upon unverified assertions, whims, falsehoods, and facetious or malicious mystifications.

The statistics and other information given in this report have been obtained in most cases by personal investigation. Under the headings of "Conditions of Workingwomen" all of the establishments visited are not given, but only enough to show the condition of female wage earners in certain lines of business. By showing the treatment, hours of labor, wages paid, etc., in five or six places, in any particular line of business, it is proper to conclude that one has arrived at the general average. For instance, nearly all the factories in San Francisco, where girls are employed, were paid an

official visit, and in like manner nearly all the stores where women are employed as saleswomen, seamstresses, milliners, etc., and results noted. From these selections were made which were considered the best to indicate the conditions of the female workers in these places.

CHAPTER II.

UTILITY OF LABOR BUREAUS.

The utility of Labor Bureaus has passed beyond the experimental stage. They have become recognized indispensable National and State institutions. Outside the United States Labor Bureau at Washington they have been established in Massachusetts, Pennsylvania, Missouri, Ohio, New Jersey, Illinois, Indiana, New York, California, Michigan, Wisconsin, Iowa, Maryland, Kansas, Connecticut, North Carolina, Maine, Minnesota, Colorado, Rhode Island—twenty States in all. Six years ago only seven States had Bureaus of Labor. This rapid extension is mainly owing to the universal popular demand for correct statistics relating to industry. At no time in the history of the world have the relations existing between capital and labor commanded such attention as now. Demands for reform and improvement in the condition of the wage earner are loud and imperative. Real and permanent reforms however cannot be secured unless the demands for them are based upon carefully collected statistics. Both the capitalist and the workingman are safe when they are guided by facts. That is why the Knights of Labor, in their declaration of principles, make the demand for "the establishment of Bureaus of Labor Statistics, that we may arrive at a correct knowledge of the educational, moral, and financial condition of the laboring classes." The reports of these bureaus are highly prized and eagerly sought for by workingmen. All interested in the work of the Bureaus of Labor, who have watched their operations, cheerfully testify to their necessity and usefulness.

The prevalent idea that reports of Labor Bureaus are of interest only to the laboring classes, and are read only by them, is a mistaken one. Applications for copies of these reports come from all classes. The vast interest taken at the present day in all important questions of labor is illustrated by the enormous demand for statistics from all parts of the United States, Canada, and Europe.

Letters, asking for reports of the bureau, reach us not only from labor unions, but from boards of trade, immigration and land bureaus, colleges, and educational institutions, produce exchanges, loan and investment associations, libraries, etc.

Professional men, manufacturers, journalists, merchants, brokers, and men in official position, make practical use of the bureau reports of the several States.

In fact, as the famous statistician, General Walker, has truly said: "The country is hungry for information; everything of a statistical nature, or even of a statistical appearance, is taken up with an eagerness that is almost pathetic."

LACK OF FUNDS.

Unfortunately this bureau has not been provided with a "postage and expressage fund," like other departments of our State Government, and applications for reports from individuals can not generally be complied

with. This has the natural effect of a loss of much valuable aid and information, which, from motives of reciprocity of favors, this bureau could get in return from persons asking for statistical information. Crippling the utility of the bureau in the matter of postage is a "penny wise and pound foolish" policy, for spreading the light regarding the conditions of labor in the State is one of the great objects for which it was established.

BOARD OF CONCILIATION.

Not alone in supplying data relating to our labor industries is the Labor Bureau of value, but it also frequently acts as a channel of conciliation when employer and employé are in danger of clashing. On several occasions the Commissioners have been called upon to investigate grievances and conditions of labor, and as the facts were developed and light shed by publication in the press, the way was cleared and smoothened for adjustment and reconciliation.

Since the publication of the last biennial report the Commissioner has been called upon by trades unions to investigate the condition of seafaring men in Pacific Coast vessels; condition of labor on the wharves and on the city front; the causes and results of a labor strike in San Pedro; the treatment of working girls by contractors or sweaters; labor of male and female printers in certain establishments in San Francisco and Oakland; contract labor in our State Prisons.

The work in this direction done by the bureau has supplied the place which in other States is done at considerable cost by boards of arbitration and conciliation. It has entailed much cost in the way of shorthand reporting, transcribing, clerical, and traveling expenses, thereby still further diminishing, in a manner unprovided for, the small appropriation for contingent expenses of the bureau. Results following these investigations have been most encouraging, as can be seen by reference to the reports of same included in Part VII of this volume. Bureaus of Labor Statistics have no partisan mission, and whenever they assume one, their usefulness is at an end.

In the open investigations which have been held by this bureau, I gave free scope to all parties interested to present all the facts in the matter under investigation, and in my reports of the results I have given my conclusions regardless of the person or interest likely to be affected. The work of the bureau is limited to the collection, elucidation, and publication of facts. When such facts show that the laborer is ill-treated or paid unjust wages the Commissioner has not the power to punish the offender or obtain redress for the sufferer. As the eminent economist and statistician, now at the head of the United States Department of Labor Statistics, Colonel Carroll D. Wright, has pointed out: "It should be remembered that a Bureau of Labor cannot solve social or industrial problems, nor can it bring direct returns in a material way to the citizens of a country, but its work must be classed among educational efforts, and by judicious investigations and the fearless publication of the results thereof, it may, and should, enable the people to more clearly and more fully comprehend many of the problems which now vex them."

ANNUAL REPORTS OF BUREAU.

The Bureau of Labor should publish annual instead of biennial reports. Statistics to be valuable should be fresh, full, and correct. *Freshness* is a most essential quality. Under the biennial system the work of one year

has often to be done over again without the former having been published. Statistics are relied upon as of great value in scientific and economic inquiries, and are indispensable for intelligent legislation. Their usefulness depends, however, as much upon their prompt publication as upon their correct compilation. In these days of lightning dispatches and hourly editions of newspapers, two-year old news is very stale indeed. Some Eastern States, not content with the statistics supplied by the United States decennial census, have a State census taken, at enormous expense, every fifth year after the former. Nearly all the twenty-one Bureaus of Labor now established in the United States publish annual reports. California is out of line with these States.

Reciprocity of work and interchange of statistics cannot, for obvious reasons, exist between this bureau and those publishing annual reports. At the Annual Convention of Labor Commissioners, held in Boston, Massachusetts, June, 1885, concerted action was taken by the Commissioners of fifteen States for the presentation annually of a series of statistics covering in their scope a very large proportion of the industries of the country. As mutual coöperation was an essential factor in carrying out this design, this bureau, not being able to keep step with the annual publishing bureaus of the Eastern States, has to lag behind. This should not be the case. In nearly every other department of our State Government California is abreast of the times, and so she is in her conception of the plan of operations for the Bureau of Labor. What is lacking is the means to carry out the design and the law binding annual limit of time in which it should be done. In the course of investigation into conditions of labor it often happens that great abuses are discovered. These should be exposed as soon as possible. An evil exposed is half remedied. Victims of fraud or tyranny should not have to wait two years for redress. The rise and fall in the prices of labor, the increase or decrease in our manufacturing industries, the fluctuations in values and conditions as they affect wage earners, should be published at least annually, to be of value. Newspapers, boards of trade, immigration societies, transportation companies, and all interested in the healthy growth of the population of California, want fresh as well as reliable statistics regarding the condition of our industries and our working classes, for publication.

In the work of collecting the information contained in this report, I desire to acknowledge the invaluable aid and untiring services of my deputy, Mr. John G. Leibert, Jr. He had to work far beyond the limits of the official hours—from 9 A. M. to 5 P. M.—for it must be borne in mind that the labors of an entire day can often be summed up in a single sentence or two or three figures.

PART II.

WORKINGWOMEN.

CHAPTER I.

LINES OF INVESTIGATION.

The field of inquiry mapped out for this bureau, under the law creating it, is of vast extent. I have confined its investigations, however, to a few special branches, with the view of making them as thorough and complete as the limited means at my disposal would allow. This is the method under which the most successful bureaus have been conducted, and is, undoubtedly, the proper one.

The condition of women who labor for a living—their wages, hours of labor, treatment, and surroundings—the condition of trades unions in the State, apprenticeship, manual training, and building and loan associations, constituted the special lines of inquiry upon which I entered upon assuming the duties of Commissioner. My labors were of necessity chiefly confined to San Francisco. This great city, with its cosmopolitan character and its ever increasing demands for labor, afforded a wide and diversified ground for exploration.

According to the United States census of 1880, the number of women and girls in San Francisco engaged in all occupations as wage earners, was fourteen thousand one hundred and forty-two. As the city has increased about 50 per cent in population since then, twenty thousand would not be an under-estimate of the number of women and girl wage earners in that city at present, if we were to take population alone as a basis of comparison. But there was a far wider divergence in the proportion of males to females in California in the year 1880 than in 1888. Women panted for their share of California's precious gifts, and have been crowding in so as to produce a more natural equilibrium between the sexes than what formerly existed. Another important consideration is that the trades and occupations in which females are employed are increasing yearly in number. Fifty years ago, outside of employments of a domestic nature, there were only about half a dozen occupations open to women, such as spinning, weaving, dressmaking, and millinery. It was "stitch, stitch, stitch," from morning until night, and nothing beyond. The idea of a woman entering upon the profession of medicine or law would be scouted as preposterous.

Woman was considered unfit and unqualified in that sphere in which in these our days she has achieved such glorious results, viz., a teacher in our schools. It would then have been looked upon akin to a degradation for a juvenile in pants to be placed under a pedagogue in petticoats. If our grandfathers could come back from that "bourn from whence no traveler returns" and read the sign "Lady Barbers" over a barber shop in some leading thoroughfare, they would think the days of anti-Christ had come. "Times have changed, and we have changed with them." To-day

there are over three hundred occupations in which women are employed. They are constantly encroaching upon what was recognized as the exclusive domain of the opposite sex, so that complaint is made upon the part of the men that this will have the effect of cutting down their wages to the starvation point.

FILLING BLANK FORMS.

In trying to obtain a knowledge of the condition of our woman, boy, and girl wage earners—economical, moral, sanitary, physical—the various occupations were taken indiscriminately throughout the city, so that the information gathered could be representative. I regret that the limited means at my disposal did not enable me to obtain a larger representation of these conditions from each class. The working girls themselves, though generally willing to answer the questions put to them, would not fill out the “forms” left in their hands. In some establishments the young women tried to display tawdry wit in burlesque replies to the questions asked in the “form.” All the matter tabulated in this report giving the condition of workingwomen was obtained by those connected with the bureau questioning the females personally. This apathy or indifference towards any movement or work tending to advance the cause of labor is chiefly owing to the want of organization among women. Among the trades unions I had but little difficulty in gathering statistics required by the bureau. Workingwomen need to be enlightened as to their wants and requirements, and the best way to accomplish this is for them to discuss and take counsel from one another how to bring about reform.

There is, I believe, only one labor organization in San Francisco exclusively composed of women, and that is an Assembly of the Knights of Labor. I had hoped, and in fact, it was so arranged, that I should have the privilege of personally explaining to that body the aims and purposes of the bureau in asking for the information indicated in the following blank “form.” Unfortunately, I was given to understand that the rules of the Knights of Labor would not permit this to be done, which is strange, when I was allowed that privilege in other places. If I could have enlisted the coöperation of some of these women, who are among the most active, intelligent, and trustworthy of their sex, I could have reached a number of workers, and obtained data regarding their condition, which would be of great value. It would be highly important to have correct statistics regarding the number of females engaged in the different industries of the State, or even in San Francisco; but one man cannot do the work which the United States officials will have to employ at least fifty in doing two years from hence. The following is the “form” which was filled in collecting statistics relating to female wage workers, not including domestics. The data given applies both to women and girls:

STATE OF CALIFORNIA, BUREAU OF LABOR STATISTICS, }
220 SUTTER STREET, SAN FRANCISCO. }

The Bureau of Labor Statistics desires your coöperation with a view to more fully and accurately collect the necessary data upon which to make an intelligent report regarding the condition of female employés. The Commissioner need hardly remind you that it is only by such coöperation on the part of individuals that he can obtain reliable statistics for compilation in the biennial reports. Without such information no correct understanding of the needs of the laboring classes can be formed, and no recommendation for their advancement can be made.

You are directed to fill out the blank form on the inside as accurately as possible, and return the same to this office at your earliest convenience.

Your prompt compliance with this request will materially aid this department, and further the ends contemplated by law.

In case there should be any apprehension on the part of those receiving this form that

answering any of the questions in the blank may be prejudicial to their personal or business interests, the Commissioner desires it to be distinctly understood that the bureau will preserve the strictest confidence with all supplying information, and no names of persons, except by express permission, will appear in the report, or be otherwise given to the public.

Respectfully yours,

JOHN J. TOBIN,
Commissioner.

N. B.—All returns strictly confidential. No names will be mentioned in reports. Blanks destroyed after being used.

FEMALE EMPLOYÉES.

GENERAL.

1. Number,.....
2. Name,.....
3. Residence,.....
4. At home,.....; boarding house,.....; lodging house,.....; private family,.....;
5. Occupation,.....
6. Are you paid by the piece?
7. Price paid per piece,.....
8. Establishment name,.....
9. Industry,.....
10. Locality establishment,.....
11. Age,.....
12. Conjugal condition,.....
13. Birthplace,.....
14. Birthplace of father,.....
15. Birthplace of mother,.....
16. Began work at,..... years of age,.....
17. State of health at present time,.....

WEEKLY WAGES IN PRESENT OCCUPATION.

18. Highest,..... \$.....
19. Lowest,..... \$.....
20. Average,..... \$.....

BOARDING AND PERSONAL EXPENSES.

21. Amount paid weekly for room,..... \$.....
22. Amount paid weekly for board,..... \$.....
23. Amount paid weekly for meals at restaurants,..... \$.....
24. Amount paid weekly for room and board,..... \$.....
25. Expense the past year for room and board,..... \$.....
26. Expense the past year for clothing,..... \$.....
27. Total actual expenses the past year,..... \$.....
28. Savings for the past year,..... \$.....
29. Deficit for the past year,..... \$.....

HOURS OF LABOR.

30. Begin work at,.....; end at.....
31. Time for lunch,.....

SANITARY.

32. Is there free circulation of air through and about the building in which you work?.....
33. Are there offensive odors in the rooms occupied by employées; if so, from what causes?.....
34. Are there facilities for washing?.....
35. Are employées compelled to stand at their work?.....
36. Are there proper and separate facilities for change of dress by males and females?.....
37. Are there separate water-closets for males and females?.....
38. Is your workshop in cellar or basement?.....

SAFEGUARDS AGAINST FIRE.

39. Is your factory or workshop provided with fire-escapes?.....
40. Are facilities for exit in case of fire good or bad?.....
41. What cause, if any exists, have you to fear danger from fire in your factory or workshop?.....

REMARKS.

(Make any suggestion that you think will tend to improve your condition at work?)

CHAPTER II.

GENERAL CONDITIONS OF WORKING ESTABLISHMENTS.

AGRICULTURAL IMPLEMENTS, MACHINERY, FILES, TACKS, AND SMALL NAILS—GENERAL CONDITIONS.

Number of women employed, 5; boys, 50; men, 195; total, 250. Highest wages paid to machinists, \$5; lowest, \$2; average, \$2 50. Highest wages paid to tackmakers and nailers, \$4; lowest, \$2 50; average, \$3 50. Highest wages paid to filemakers, \$2 75; lowest, \$2 75; average, \$2 75. Highest wages paid to molders, \$3 50; lowest, \$3 25; average, \$3 25.

Rolling Mill Department.—Highest wages paid to rollers, \$5; lowest, \$3; average, \$4. Highest wages paid to heaters, \$5; lowest, \$3; average, \$4. Highest wages paid to hookers, catchers, etc., \$3; lowest, \$2; average, \$2 50. Scrap pilers and laborers earn from \$1 to \$1 75 per day. Boys earn from \$3 to \$4 50 per week. Women tack packers earn about \$9 per week at piece work. Hours of labor, 10 hours per day. The location of the mill is close to the bay, in a healthy neighborhood.

BOOKBINDERS, SACRAMENTO—GENERAL CONDITIONS.

Twelve women and girls employed. Hours of labor from 8 A. M. to 6 P. M.; half an hour for lunch. Wages for folding and sewing, 5 cents per 100; female time workers, \$7 to \$8 per week; paper rulers, men, \$3 50 per day; forwarders, men, \$3 to \$4 per day; finishers, men, \$4 per day.

BOOT AND SHOE FACTORIES—GENERAL CONDITIONS.

No. 1. Thirty females, 15 boys, and 150 men are employed. Ages of females, from 14 to 19; ages of boys, from 13 to 18. Hours of labor from 7 A. M. to 5:30 P. M. Number of piece workers 85, and time workers 35. Average weekly wages of men \$15; experienced females earn from \$8 to \$9 per week; boys, from \$4 to \$9; lowest wages to girls, \$2 50 per week. No Chinese. Workshop on third floor. Separate toilet rooms and closets for the sexes. Light and ventilation good. No means of fire escape but by one stairway.

No. 2. Females employed 81; boys, 20; and 151 men. Ages of girls, from 14 to 21; ages of boys, from 13 to 18. There are six girl apprentices who work two months without wages, then \$2 50 per week. Number of piece workers, 210; time workers, 45. Highest wages paid to females, piece workers, \$18; average, \$12 per week; boys average \$4 per week; men, \$18 per week. Hours of labor from 7 A. M. to 5:30 P. M. No Chinese employed. Workroom large, airy, and has good light. Separate dressing rooms and water-closets for the sexes. Fire escapes are very poor; no way of escape but by a narrow stairway.

No. 3. Females employed, 40; boys, 10; and 140 men. There are 26 boy and girl apprentices, who serve three months gratis and are then paid by piece work. Wages of men, from \$12 to \$30 per week; women, from \$5 to \$18. Ten hours work per day. Workroom large, well lit and ventilated.

No. 4. Females employed, 16; boys, 9; and 60 men. Wages of females, from \$8 to \$10 per week; boys commence at 50 cents per day; first class cutters (men) get \$3 to \$3 50 per day; girl apprentices average \$3 50 per week; men average \$18 per week. Hours of labor from 7 A. M. to 6 P. M. Boys earn from \$4 to \$9 per week. Workroom large, well lit and ventilated.

No. 5. Females employed, 85; boys, 20; men, 150; and 90 Chinese. Average wages to a white, skilled mechanic, \$18 per week; Chinese average \$1 25 per day; females \$10 per week. Workshop large, well lit and ventilated. Separate dressing rooms and water-closets. Fire escape only by stairway; buckets of water placed around to be used only in case of fire.

No. 6. Females employed 3; men, 3; and 100 Chinese. Women are paid by the piece, and earn from \$7 to \$9 per week. Hours of labor from 7 A. M. to 5:30 P. M. Light, ventilation, and sanitary conditions, good. About 20 Chinese working at machine in the same room with white women. Proprietor, Chinaman.

CANDY MANUFACTURERS—GENERAL CONDITIONS.

No. 1. Number of girls, 12; wages of girls, \$4 per week or 75 cents per day; ages of girls, 17 to 25. Number of boys, 4; wages of boys, \$5 per week. Hours of work, 7 A. M. to 5:30 P. M. Men are paid (good candy makers) \$3 per day. Girls are in greater supply than demand—mostly in wrapping and packing candies. Place is to be enlarged—started about fourteen years ago on small capital—to-day they can make from 1,500 to 2,000 pounds of candy per day. The improvement will necessitate more hands, as they will turn out about 5,000 pounds daily. Ship candies to Australia, China, Central America, and all over the coast.

No. 2. Number of girls employed, 6; ages of girls, 15 to 18 years; wages of girls, \$4 50 to \$6 per week. Number of boys, 10; wages of boys, \$20 to \$60 per month. Number of men, 100; wages of men, \$15 to \$20 per week. Behavior of girls good, diligent, and inclined to work. Boys have to be watched all the time. Apprentices give too much trouble. No waste in candy. Glucose imported from New York.

No. 3. Number of boys, 3; ages of boys, 14 to 18; wages of boys, \$4 to \$6 per week. Hours of work, 7 A. M. to 6 P. M. Number of girls, 1; age of girl, 18; wage of girl, \$6 per week. Candy makers paid \$3 per day. It takes smart men about five years to learn the business. Technical school would be a good idea; it could qualify girls and boys to fill better positions than they occupy at present. Glucose imported from Geneva. Under old rates could get it for 50 cents, now it is \$2 35 per hundred.

No. 4. Number of men employed, 13; wages of men, \$2 50 to \$3 50 per day. Number of boys, 12; ages of boys, 14 to 18; wages of boys, \$3 to \$12 per week. Number of girls, 12; ages of girls, 16 to 20; wages of girls, \$3 to \$7 per week. Hours of work, from 7 A. M. to 5:45 P. M. Disposition of girls very good; they are most employed sitting, and show a strong desire to work; gives them every encouragement by paying them extra and advancing their position. All the filigrees for candies are imported from New York. Six years ago only 4 people were employed at work. Very little candy is now imported; the chocolate is imported, also maple sugar; molasses comes from New Orleans. Technical school would be of great advantage to the girls.

No. 5. Number of girls, 5; wages of girls, \$3 to \$9 per week; ages of girls, 16 to 23. Hours of work, 8 A. M. to 6 P. M. Number of boys, 6; ages of boys, 16 to 21; wages of boys, \$3 to \$9 per week. Wages of good candy-makers, \$3 to \$3 50 per day. The interstate law benefits them by stopping importation of candies. Mostly city trade; turns out about 1,500 pounds per day; had about 4 employed when first started; almost ten years in business. The line of work the boys and girls are in does not warrant a technical training; they are employed in wrapping and packing; all have sitting positions. Men do moulding, pulling, and all heavy work.

No. 6. Factory girls, 9; wages, \$5 to \$6 per week. Salesladies, 8; wages, \$7 per week. Hours, 7:30 A. M. to 6 P. M.

CLOAK AND DRESSMAKERS—GENERAL CONDITIONS.

No. 1. Number of women employed, 45; number of girls under 18, 5 to 6. Wages, from \$3 to \$9 per week. There are two workrooms; one crowded off store, and one also crowded under sidewalk; ventilation very bad; water-closet in vicinity; bad light; totally unfit for workers.

No. 2. Girls employed, 4; ages, 13 to 24; one girl apprentice, aged 13; must work one month before getting wages; then \$1 per week. Hours, 8 A. M. to 6 P. M.; lunch one hour. Wages, \$1 to \$7 per week. Workroom in cellar, under sidewalk; very small; badly ventilated; lit from gas in sidewalk; have to work by gaslight during winter.

No. 3. Twenty girls in a small back room off rear of store floor; 20x12 feet; very badly ventilated; heat oppressive. Wages, from \$8 to \$12 per week. Hours, 8 A. M. to 5:30 P. M. Eighteen girls under sidewalk; dark; only lit by glass in pavement; very cold and damp; odor from sewers very bad. Water-closet in vicinity, used by both sexes; many men are employed as salesmen, who visit the closet; it is in a dirty condition. One lady worked seven years, and received \$10 per week. Wages in cloak department, \$6 to \$10 per week.

No. 4. Twelve girls employed. Pays the apprentices \$1 per week first three months; next three, gets \$2 per week; then rated according to proficiency; highest is \$10 per week. Workroom clean; good light and ventilation.

No. 5. Under sidewalk; small room; six girls working; ventilation through grating in sidewalk. Wages, \$1 to \$7. Gas burning all day, making air hot and fetid. Ages of girls, 13 to 24. Apprentices serve three months for nothing. Work from 8 A. M. to 6 P. M.

No. 6. Fifty women and girls employed. Wages, from 50 cents to \$9 per week. Apprentices are paid 50 cents per week, and as soon as they learn the business are paid from \$3 to \$4 per week. Workroom kept in good condition, but overcrowded. The girls are often obliged to work until 10 and 11 P. M.

No. 7. Twenty-five women employed—5 salesladies, and 20 cloak and dressmakers. Salesladies are paid \$30 to \$60; average, \$40 per month. The average wages for sewing women are \$7 per week; but the wages run from \$5 to \$10, rated according to proficiency.

No. 8. Fourteen girls. Work from 8 A. M. to 6 P. M. The average cloakmaker's wages are \$6 per week; some get \$7 50, \$8, and as high as \$12 per week, rated according to proficiency. Saleslady gets \$7 per week.

No. 9. Fourteen girls. Hours, 8 A. M. to 6 P. M. Wages, \$4, \$5, and \$6 per week. Forelady, \$9; saleslady, \$8.

CALIFORNIA COTTON MILLS, EAST OAKLAND—GENERAL CONDITIONS.

This is the only cotton manufactory on the Pacific Coast. The buildings cover about half an acre of ground, all of which—workrooms, storehouses, etc.—are of brick and of one story. The principal factory has an area of 125 by 100 feet, and contains the latest improved machinery. The location is healthy, and the surroundings very pleasant. The articles manufactured are chiefly carpets, sail cloth, rope, and twine. The manufacture of twine is the most extensive of all, as the company supplies nearly all the twine used on the Pacific Coast.

Number of women and girls, 165; number of men and boys, 65. Hours of labor from 6:50 A. M. to 5:50 P. M.; forty minutes are allowed for lunch. There are 12 girls under 15 years of age, and 8 boys, whose wages run from \$1 50 to \$4 per week. Wages are chiefly paid by piece work. Women earn from 75 cents to \$1 50 per day.

The following is the schedule of wages paid: Foreman of pickers, etc., per week, \$20. Highest per week, pickers, \$12; spinners, \$7 50; twisting, balling, and spooling, \$8; warp-

ing and starching, \$2 50. Lowest per week, pickers, \$6; spinners, \$6; twisting, balling, and spooling, \$6; warping and starching, \$2 50. Average per week, pickers, \$7; spinners, \$7; twisting, balling, and spooling, \$7 50; warping and starching, \$2 50. Loom fixers, \$2 to \$2 75 per day. Foreman of weavers, etc., per week, \$18. Highest per week, weavers, \$11; spinning doffers, \$4 20; dyers, \$18. Lowest, per week, weavers, \$6; spinning doffers, \$3; dyers, \$7 50. Average per week, weavers, \$7 50; spinning doffers, \$3 75; dyers, \$12. Average wages paid to women and girls, per week, \$7 50. Average annual earnings of women and girls, \$375. Wages paid to boys, per week, \$3 60 to \$6.

Boys about 9 years of age are paid 60 cents a day after three months work. The work-rooms are large, roomy, well lit and ventilated. Order and cleanliness prevail everywhere in and around the factory. There are separate water-closets, and commodious, well arranged toilet rooms. The machinery, belting, etc., are under the workrooms, so there is no danger of the employes running risk of loss of life or limb by coming into contact with them. There are sixteen carding machines in the factory. Besides cotton manufactures, salt, sugar, and coffee sacks, also rope and twine, are made from jute. The superintendent complained of the competition in convict-made twine at San Quentin. He said that "the quantity of twine sold by the prison officials will not have much effect if they will only keep up prices. But if they increase the product it will demoralize the trade. The price of fleece twine at the mills up to May last ranged from 6 to 8 cents a pound; now the prison product is sold at 6 cents. The State," he said, "ought to stop making this twine, as it seriously interferes with free labor, and the attention of the San Francisco Board of Trade has been called to the subject. Our jute twine machine is at a standstill, and until the stock on hand is sold it will not start up again. We do not make jute goods in competition with the prison, but I hear that it is intended to increase the manufacture at San Quentin, so as to include coffee and bean bags. If this should be done our mills might as well shut down."

On the other hand, the authorities at San Quentin assert that the quantity of twine made at the prison was so small that it would not have any effect on the market. Captain Thomas, who is the Superintendent of the jute factory in San Quentin, gives the following statement as to the manufacture of twine by the convicts:

July 1, 1882, to December 31, 1882	20,461 pounds.
January 1, 1883, to December 31, 1883	56,034 pounds.
January 1, 1884, to December 31, 1884	17,670 pounds.
January 1, 1885, to December 31, 1885	60,867 pounds.
January 1, 1886, to December 31, 1886	55,805 pounds.
January 1, 1887, to July 23, 1887	50,790 pounds.
Total	261,627 pounds.

This twine consists of the kind termed fleece and hop twine, and is made of the best portion of the jute. The San Quentin product is in demand by the farmers and wool grower, who apply for it to the wholesale firms that purchase it from the prison.

To this he added that "if all the prison-made twine had been used for fleece ties, and only used in this State, it would not have sufficed for but 40 per cent of the demand." He denied that it was the intention to increase the manufacture of twine at San Quentin. With regard to the supply of raw material, the Superintendent said "that the Interstate Commerce Bill was a boon to the cotton industry of California. It prevented the 'ruinous competition' which eastern manufacturers had in the past offered, and at the same time gives the cotton producers of this State encouragement. The difference in the freight almost doubles the cost of getting the raw material hither from Texas, and the factory would be compelled to get its raw supplies, in the main, from Calcutta. The raising of cotton in California had not yet reached such a stage as to supply the market; but the advance in that direction was rapid, and it was calculated that over 600 bales would be grown here this year. Factory tests showed the cotton grown in San Diego to be the best produced anywhere in the world, aside from the sea islands. In texture it was finer, and it had more surface, and endured much better than eastern cotton, and the twine from it was incomparably stronger. The cotton manufacturers consider, in the light of all these things, that California gives promise of taking a leading place in the production of cotton."

The following communication, on the part of the operatives in the cotton factory, was presented to the bureau:

"Convict Labor Competition with the Cotton Manufactory of East Oakland.

"The State Prison has at present some twisting machinery for making twines that was ostensibly for the purpose of making twist for selvages of bags, and twine for sewing bags out of the cloth made at the prison. For some years past they have begun making twines for sale, viz.: fleece twine, in small quantities at first; but last year, from statements received from them, they sold about 60,000 pounds, at 6 cents per pound, and out of this 11,000 pounds were hop twine. This gave employment to 6 men for 85 days, according to their statement, which shows the small amount of labor they can utilize at this work. We began making this jute twine on starting our mills, and sold quantities of fleece twine; and last year we had a party working for us in the hop districts, and got a number of the hop growers to try our large jute twine in room of sisal, which they had been using previously.

"Now, the points we wish to bring before the Governor are these:

"*First*—The San Quentin State Prison makes twine which is in direct competition with our free white labor of girls and boys.

"*Second*—That the amount of convict labor which this twine making employs is nominal, the machinery doing all the work, and only requiring boys and girls to attend.

"*Third*—That the field for this twine is very limited, and there is no room for strong competition, our mills being sufficient to supply the demands.

"*Fourth*—That the prison officials be instructed, through the Directors, to confine themselves to the making of grain bags only, which trade has an unlimited field, over 25,000,000 being imported yearly.

"*Fifth*—The present twisting capacity of the prison can be fully utilized in making twine and twist-yarn for bags made by themselves—sufficient for all the new plant which they may get."

FRUIT CANNERIES—GENERAL CONDITIONS.

No. 1. Number of females employed, 300; males, 100. Hours of labor from 7:30 A. M. to 5:30 P. M. Overwork very frequent in the season. Wages paid by the piece, as follows: Packing currants, per box, 5 cents; strawberries, three boxes, 10 cents; apricots, per box, 4 cents; peaches, per basket, 1½ cents; plums and pears, per basket, 15 cents. Canning apricots, per tray, 2½ cents (20 cans in a tray); peaches, per tray, 3 cents; plums, strawberries, and currants, 2 cents. Cutting peaches, 4 cents per basket—average about twelve baskets per day. Average earning of females, \$1 10 per day. Most of the girls are poorly dressed, and many appear to be of the very poorest class. They represent a great many nationalities—American, Irish, Spanish, German, Scandinavian, and a few negroes; nearly half are Italians. The establishment is large and well ventilated on ground floor; drainage bad; floor dirty and sloppy; no seats provided; there are separate water-closets for the sexes.

No. 2. Number of females employed, 100; males, 40; boys, 3. Hours of labor from 7 A. M. to 5:30 P. M.; half an hour for lunch. Wages: Peeling peaches, 15 cents per basket; pears, 25 cents per box; apricots, 5 cents per box; tomatoes, 2 cents per bucket; cherries, 2 to 5 cents per drawer, according to capacity of drawer. When females work by the hour they are paid 8½ cents an hour, or about \$5 per week. Men are employed in capping and cooking fruit, and are paid 25 cents an hour. The assorter of fruit is paid \$75 per month. The cannery is not roomy; seats are not provided for workers; separate water-closets are there, but no washing facilities; drainage bad, and floor sloppy. Most of the women are Italians, and the remainder represent nearly all races and colors, except Chinese.

No. 3. Number of females employed, 350; males, 100. Hours of labor from 7 A. M. to 6 P. M.; half an hour for lunch. Average wages paid to women, \$5 per week; men are paid from \$9 to \$12 per week; foremen are paid \$20, and forewomen \$7 per week. Value of fruit packed and canned for the past year amounted to \$400,000; amount paid for labor, \$54,000.

San José.

No. 4. Number of females employed, 175; males, 25. Hours of labor from 7 A. M. to 6 P. M.; one hour for lunch. Female packers are paid \$1 per day; female cutters are paid 75 cents to \$1 per day; female cutters of peaches and pears earn from \$1 to \$1 75 per day, paid by the piece. Men are employed in cooking fruit; foreman gets \$100 per month, and is employed for the whole year; the other cooks get \$2 per day. Cannery large, clean, and well ventilated; girls working are well dressed and evidently of a respectable class; location and surroundings are agreeable.

No. 5. Number of females employed, 400; males, 40. Hours of labor from 7:30 A. M. to 6:30 P. M.; one hour for lunch. Wages of females, 50 cents to \$2 per day; average, \$1 per day; wages of males from \$1 25 to \$2 50 per day; females paid by time work receive \$1 per day. This is the largest fruit cannery on the Pacific Coast, having a packing capacity of fifty tons of fruit per day, and is said to be the largest in the world. The establishment is a model one of its kind; its location, surroundings, rooms, ventilation, and sanitary arrangements being all that could be desired. Seats for workers, toilet rooms, and separate water-closets are provided. Everything tending to the comfort, cleanliness, and proper treatment of the employés seems to be attended to. The result is that young ladies of education and refinement are not ashamed to be seen at work there.

No. 6. Number of girls and women, 200; men, 35; Chinese, 25. Hours of labor from 7 A. M. to 5:30 P. M. Wages: Peeling peaches, 12 cents per basket; peeling apricots, 7 cents per box; labeling cans, ¾ cents per case of 24 cans to a case; label 8,000 cans per day; average from \$2 to \$2 25 per day. In fish season wages run from 75 cents to \$2; average \$1 25. The caser gets \$9 per week; pickler gets \$2 per day. There are four cooks who get from \$60 to \$80 per month. Can makers get 40 cents per 100 for 1 gallon cans; 80 cents per 100 for 2½ gallon cans.

No. 7. Number of women and girls, 220; boys, 20; men, 40; Chinese, 45. Capacity of factory, 40,000 cans per day when in full operation. Hours of labor from 7 A. M. to 5:30 P. M.; half an hour for lunch. Overtime paid for at same rates as regular time. Peeling peaches and pears, 12½ cents per basket; peeling apricots, 4 cents per box; canning cherries, 2 cents to 12 cents per box, according to size of box. About 50 girls, from 10 to 14 years of age, at 4½ cents per can for currants, earn about 50 cents per day. Women and girls canning apricots earn about \$1 per day, and peaches and pears from \$1 25 to \$1 75 per day. Females employed in factory (ordinary hands) average about \$1 per day; forewoman gets \$9 a week; Chinese cooks get \$2 per day; chief cook, \$2 50; solderers get

\$9 per week; common Chinese get \$7 per week; girls employed in labeling cans get \$7 per week; Chinese can makers, working by time, earn \$9, and by piece \$12 per week. Some of the female employes are allowed to sit on stools, but many are not, because, as was alleged, it would interfere with their work. This factory is a new, large, roomy, well lit and well ventilated building. It is kept clean. Separate water-closets are provided. Two Chinamen do the cooking for women and girls at lunch time, such as heating tea and coffee and boiling eggs, potatoes, etc. Lunch is generally partaken of in a planked, inclosed, sunny yard, where there are tables for food and boards for seats.

No. 8. Number of women employed, 250; girls, 50; men, 20; Chinese, 80. Women and girls are employed in peeling, cutting, and assorting fruit, and in canning and labeling. Men are employed in handling, freighting, and trucking fruit, and in making and packing boxes. Chinamen are employed in cooking fruit, in making and soldering cans, capping jars, and in promiscuous labor around the cannery, such as cleaning, scrubbing, etc. As nearly all labor is paid by the piece, there are no set hours of labor. Wages for assorting, cutting, and pitting apricots, 10 cents per box of from 30 to 35 pounds. Women fill from 10 to 20 boxes per day, making from \$1 to \$2. For canning fruit, 2 cents per dozen. Women fill from 50 to 75 per day. For filling jars (apricots), women get 7 cents per dozen, and earn from \$1 to \$1.50 per day. Berries, 2 cents per tray; peaches, 2 to 3 cents. Girls are allowed to take home fruit-peeling machines, and do the work of peeling fruit in their homes during the evening. Men get from \$1.50 to \$2 per day. Chinamen are paid from 10 cents to 12½ cents per hour. If they work at night they are paid 15 cents per hour. The cannery is composed of two large buildings running parallel. There are also out-houses. The grounds cover an entire block. The buildings are new, remarkably clean, well lighted and ventilated, and well adapted for the purpose. The floors, tables, stools, trays, etc., in cannery are washed and cleaned every day. Order and neatness prevail everywhere. A room, in charge of a competent woman, is set apart for a dressing room for females, where they can put on their working clothes. Each one has in this room a compartment for the safe keeping of her hat, dress, lunch basket, etc. Separate water-closets are also provided. In consequence of this attention to cleanliness and due consideration for the wants of the female employes, a very respectable class of women and girls is obtained. Their appearance, when at work, is healthy and cheerful.

The Chinamen work on the same floor with the women, but are confined to one end of the building. It would be better if they were separated altogether, which could be done by dividing the room by a partition. The proprietors say they have done all in their power to displace Chinese by white labor, but the latter would not do the work to their satisfaction. When the hour of 6 p. m. arrived, white men and boys would leave the cannery, although much more work remained to be done, and the result would be that a large amount of fruit would be destroyed. Chinese, on the contrary, will work overtime in the busy season, and the managers do not run the risk of loss. Another cause of objection to American boys is that they will flirt with the girls in the cannery during business hours. Young boys, also, are in the habit of filling their pockets with small fruit, and, not content with eating their fill, amuse themselves by pelting one another with the fruit. No complaint is made about the girls, who do their work well and cheerfully. The manager says that if the California boy would only behave himself no boy anywhere could surpass him as a worker. American boys will never work well in the same establishment with the Chinaman.

FRINGES, CORDS, ETC., MAKERS—GENERAL CONDITIONS.

No. 1. Ten women, 4 boys, and 4 men employed. Wages paid by the piece; average wages paid to men, \$15 per week; average wages paid to women, \$6 per week; average wages of boys, \$5 per week. Hours of labor from 7 a. m. to 6 p. m.; one hour for lunch. Workroom large, clean, and well ventilated.

No. 2. Thirty girls employed in reeling and sewing. Hours of labor, 8 to 6—both piece and time workers. Average \$4 to \$6 per week. The workshop is on the third floor of the building; closet used in common. Fire escapes are not considered, the stairway being the only means of exit. Place otherwise light and well ventilated.

FUR GOODS—GENERAL CONDITIONS.

No. 1. Number of hands, 100; number of apprentices, none; number of females, 80. Knowledge of the business is acquired at home. Hours from 8 to 6. Employer approves of articulated apprenticeship. Workshops on upper stories, and are well lit and ventilated.

No. 2. Twelve women, 1 boy, and 3 men employed. Highest wages paid to men, \$15; average wages paid to men, \$12. Women earn from \$3 to \$7 per week. Workroom on top floor. Good light and ventilation, but not clean.

No. 3. Two girls, sewing furs. Hours, 8 to 6. Wages, \$5 and \$6 per week in summer, and \$8 and \$9 in winter. Saleslady gets \$7 in summer, and \$9 in winter. This variation in wages is owing to the overtime in winter.

FEATHER FACTORY—GENERAL CONDITIONS.

One girl employed, curling feathers. Hours of labor, 8 a. m. to 6 p. m. Wages per week, \$5.

GLOVE MANUFACTORIES—GENERAL CONDITIONS.

No. 1. Number of girls, 40. Wages of girls average from \$7 to \$9 per week. Hours of labor, from 9 a. m. to 4 p. m. All work by the piece, so that the hours are optional. No

girls at work under 14 years of age. Workroom small and crowded, but well lit and ventilated.

No. 2. Number of girls employed, 24; ages of girls, 18 to 20; wages paid girls (piece), \$4 to \$12 per week. Boys employed, 3; ages of boys, 18 to 20; wages of boys, \$6, and \$30 per week for good workmen. Hours of work, from 7:30 to 5:30; one hour for lunch. Have a great supply of skilled workmen. Most of the girls do their work at home, and make handsome wages. They train their sisters and others in the family to do the work. A technical school would be of great advantage in this trade, as girls and boys would find plenty of employment by taking the work home.

No. 3. Number of girls, 15; ages of girls, 18 to 40; mostly girls between 18 and 20. Hours of work, 7:30 to 5:30. Wages of girls, \$7 to \$12 per week. Number of boys, 2; ages of boys, 17 and 18. Have no apprentices, as the boys and girls will not subject themselves to be controlled, and parents will not bind their children. Motive power supplied by electricity. Most of the work is done on the outside by the hands employed, and by others who do the work at home. A technical school would be of great service to the young people, as they might be masters of the glove business, and command a large pay. Place light, airy, and well ventilated. Work sitting.

No. 4. Forty women and 15 men employed. Highest wages paid to women, \$12 per week; lowest wages paid to women, \$6 per week; average wages paid to women, \$7 50. Men cutters earn \$18 by piece work; men cutters earn \$16 50 by time work. Layers out, \$12 per week. Hours of labor, 9½ per day. Work room clean, good light and ventilation.

No. 5. Sixty girls employed both at time and piece work: Silkers, \$10 to \$14 per week; fitters average \$9 to \$10 50 per week; banders, \$9 to \$10 50 per week; driving glove makers, \$10 to \$13 per week; trimmers, \$6 to \$7 per week; fasteners, \$3 to \$5 per week; buttoners, \$3 to \$5 per week. All piece work. Men: Wax threaders, \$25 to \$30 per week; table cutters, \$18 to \$30 (piece); block cutters, \$3 per day (time); sheep skin cutters, \$1 50 to \$2 per day (time); layers off (finishers), \$6 to \$9 per week (time); apprentices, \$5 per week.

No. 6. Three girls employed in boxing, labeling, and polishing, and work nine hours per day; get \$1 per day, or \$30 per month.

HOSIERY FACTORY, OAKLAND—GENERAL CONDITIONS.

Manufactures hosiery and underwear. Total number of employés 107, as follows: Men, 14; boys, 11; women and girls, 83. About 15 girls under 16 years of age. Hours of labor: Eleven hours per day except Saturday, when work stops at noon and half an hour added for cleaning up. This makes 60 hours and 45 minutes for the entire week. Time for lunch, 35 minutes. Wages paid as follows: 1 carder, foreman, \$25 per week; 5 carders, boys, \$1 per day; 1 spinner and loom fixer, \$22 50 per week; 1 spinner, assistant, \$1 75 per day; 2 spinner boys, \$1 10 and \$1 per day; 4 spinner girls, \$1 per day; 1 finisher, forewoman, \$2 per day; 1 finisher, stoking, \$2 per day; 1 finisher, \$1 25 per day; 6 finishers, \$1 per day; 1 dyer, \$24 per week; 1 helper, \$12 per week; 2 wool washers, \$2 per day each; 1 packer, \$1 50 per day; 1 engineer, \$22 50 per week; 1 fireman, \$13 85 per week; 1 watchman, \$2 per night; 1 office clerk, lady, \$9 per week. Females at piece work average \$1 25 per day. Wool sorters, men, get 40 cents per 100 pounds, and average from \$3 50 to \$4 per day. Piece work is sometimes given out and worked by females at their homes. In the finishing room there were 35 women and girls employed, four of the latter being under 15 years of age. This room is remarkably clean, well lit and ventilated. Dressing and toilet rooms and separate water-closets are provided for the females. Each female employé has a separate locker for her clothes, and the whole arrangement of the dressing room resembles, in neatness and precision, a well ordered armory. There are facilities for cooking by gas, so that all the females employed in the establishment can heat, or, if necessary, cook their lunch with dispatch without soiling their fingers. As a result of this respectful and considerate treatment of their employés, the management have secured a most intelligent and respectable class of female workers. The visitor is at once impressed by the neat appearance and cheerful faces he meets with among the female operatives of this admirably managed factory.

HAND EMBROIDERY—GENERAL CONDITIONS.

Six girls employed in doing hand embroidery, piece work; average about \$1 25 per day. Embroidery is mostly done by machinery.

HARNESS MAKING, BRAIDING—GENERAL CONDITIONS.

No. 1. Ten girls employed braiding lashes and making pads. Hours of labor, 7 A. M. to 6 P. M. Piece workers average \$7 50 per week; time workers get \$10 per week.

No. 2. Twenty girls employed; \$7 50 per week.

HAIRDRESSERS—GENERAL CONDITIONS.

No. 1. Five girls employed; average \$7 per week. Hours, 8 A. M. to 6 P. M. The general wages, \$5 to \$10 per week; takes six months to learn the trade; nothing paid while learning; employed at hairdyeing, dressing, and manicuring.

No. 2. Seven women employed. Hairworkers, hours 8 A. M. to 6 P. M.; wages, \$3 to \$8; average, \$5. Hairdressers, hours 8 A. M. to 8 P. M.; wages, \$8 to \$15; average, \$10. Hours on Saturday, 8 A. M. to 10 P. M.

No. 3. Fifteen women employed—5 salesladies and 10 hairdressers; salesladies, \$5 to \$14 per week; average, \$9. Hairdressers, \$3 to \$8 per week. Hours, 8 A. M. to 6 P. M.

No. 4. Four girls employed. Hours, 8 A. M. to 6 P. M. A good hairdresser can average \$12 to \$14 per week; must do hairdressing, manieuring, bleaching hair, etc. The wages of the above girls are, respectively, \$8, \$10, \$12, and \$15 per week.

No. 5. Two girls. Hours, 8 A. M. to 6 P. M. Wages, \$2 50 and \$8. An experienced woman can average \$12 to \$15 per week.

JAPANNING AND TIN WORK—GENERAL CONDITIONS.

Six girls employed in soldering and making small lard cans and buckets; work by piece and average \$8 per week. In the japanning department girls get \$6 per week of ten hours' work.

CALIFORNIA JUTE MILLS, OAKLAND—GENERAL CONDITIONS.

Articles manufactured, bags, burlaps, ore bags, twine, and horse blankets. Established in 1869. In June, 1887, when I visited this establishment, there were 219 white employes, consisting of men and boys, 135; women and girls, 84; Chinese, 150; total, 369. The Chinese earned in 26 days, \$8,400, and the 219 whites about \$3,940 55. The working capacity of the mill is about 1,300 grain bags per day. In June, 1887, when I visited the mills, 705 bales of jute were manufactured into grain bags (188,000 pounds); hop cloth, 66,444 pounds; and matting, 75 rolls. In the same month the mill consumed 177 tons of coal, at a cost of \$22 22 per day; 52 gallons of oil per day, for softening jute (30 cents a gallon); and the bill for water amounted to \$93 98. The working hours are from 6:50 A. M. to 5:50 P. M., ten and one half hours per day; one half hour is allowed for lunch. Number of boys under 16, 65; girls under 16, 45. Wages of boys are from 50 cents to \$1 per day; girls from 40 cents to \$1 25 per day; wages are paid generally for piece work. Weavers earn from \$1 50 to \$2 per day; spinners from \$1 to \$1 40 per day; bag sewers from 65 cents to \$1 per day. Chinese earn from \$4 50 to \$7 50 per week. Highest wages paid to men, \$22 50 per week; lowest wages paid to men, \$7 50 per week; average wages paid to men, \$12 per week. A fine of one quarter a day is imposed for dilatoriness, according to the rules posted in the workroom. The foremen and forewomen are all of the white race, and it is the present policy of the management to dispense with, as soon as possible, Chinese labor entirely. Some five years ago the Superintendent went to Scotland and engaged a number of experienced female weavers, whom he brought over to work in the mills. The venture did not prove profitable, as the majority did not remain long enough to repay the company for the expense incurred. One cause for this was that there were too many Benedicts lounging around the neighborhood who were captivated by the blooming cheeks of the lassies fresh from the "land of cakes." The boys employed are a mixture of races, white, yellow, and black. Their ages are from 8 to 16 years. The majority are from Portugal or the Azores. Their work consists in removing empty bobbins from the spinning frames and replacing them with full ones. They have to be very quick at the business, for the machinery has to stop while they are doing this. Older hands cannot do this work so well, for it requires small, deft fingers to get in between the narrow spaces in the machinery. Few of these children have received any education whatsoever. Their parents are generally very poor and illiterate. The mothers of some work in the mill, and I have been credibly informed that some of the unnatural parents live off the earnings of these little toilers. There can be no question but that the work is injurious, both morally and physically. The children are not only deprived of education, but they are kept at work 10½ hours per day, in a heated, stifling atmosphere, impregnated with floating filaments. Their clothing is scant and poor. They look dirty and sickly. The evidence of overwork and parental neglect are palpable. Girls are also employed in bag sewing and bag piling. In the latter they earn 40 cents per day, as can be seen in the tabulated returns. Revolving machines, in close juxtaposition, without any safeguards, and belting on all sides, running at a rapid rate, render an accident liable to occur at any moment to these little ones. The workrooms are large, well lit, and well ventilated, and there are separate water-closets for males and females. The sanitary arrangements are good, but the ceilings of the workrooms are too low, and the rooms too crowded. Due attention is not paid to cleanliness. It is difficult to keep such an establishment clean, from the nature of the work, but there is considerable room for reform in this connection, on the part of the management.

LADIES' UNDERWEAR—GENERAL CONDITIONS.

No. 1. Seventy-five women and girls, 2 boys, and 12 men employed. Wages, piece work paid females, run from \$4 to \$9 per week. Hours of labor from 7:30 A. M. to 5:30 P. M. Factory large, well lit, and well ventilated.

No. 2. Number of girls, 20; ages from 15 to 23; wages of girls from \$6 to \$7 50 per week. Hours of work from 8 A. M. to 5:50 P. M.; half an hour for lunch; all paid by the day. The place is situated under the sidewalk, or in a cellar of building, where, in case of fire above, the girls could never make their escape. The only ventilation comes through the elevator shaft, rendering the atmosphere unhealthy. A technical training school in this line would be advisable and taken advantage of by the girls, as they could have a chance of a good position, being prepared and suited for work. Most of the girls learn sewing in the factories.

No. 3. Number of women, 15; number of girls, 3; ages from 12 to 13. Wages from \$1 50 to \$2 per week. Workroom on upper floor; light and ventilation good.

LACE GOODS WORKERS—GENERAL CONDITIONS.

Ten girls employed in making lace goods. Hours of labor, 7:30 A. M. to 5:25 P. M.; average about \$5 25 per week; three quarters of an hour for lunch. Work is done by machinery. About 50 girls employed at this work in city. No lace manufactured in California.

MATCH FACTORY—GENERAL CONDITIONS.

Twenty-four girls employed in wrapping and separating. Work by the piece so much per gross, averaging \$6 per week. Hours of labor, 7 A. M. to 5 P. M.

MILLINERY—GENERAL CONDITIONS.

No. 1. Six girls. Hours, 8 A. M. to 6 P. M.; alternately, each girl must work from 7 to 9 one night in week. The milliner gets \$14; the salesladies get respectively, \$6 per week; one gets \$10, forewoman.

No. 2. One girl. Trimmer and one saleslady each gets \$15 per week. Hours 8 A. M. to 4 P. M.

No. 3. Twenty-five girls. Average, \$7 per week; majority get \$3, \$4, \$5, and \$6 per week. Hours, 8 A. M. to 8 P. M.

No. 4. Two salesladies, 4 trimmers, 2 makers (inferior work). Hours, 8 A. M. to 6 P. M. Wages, salesladies, \$18 and \$20 per week; trimmers, \$18 per week; makers, \$12 to \$15 per week. These women are the most proficient in the city.

No. 5. Fifteen girls employed: 6 salesladies, and 9 in workroom. Salesladies' wages, \$6 to \$8 per week. Hours, 6 A. M. to 8 P. M. Sewing women, wages, \$5 to \$10; average, \$6 per week.

No. 6. Six girls, 3 salesladies. Hours, 8 A. M. to 8 P. M. Wages, about \$7 per week; trimmers, \$8 per week.

No. 7. One saleslady and 1 hat trimmer. Wages, \$7 per week. Hours, 7:30 A. M. to 8 P. M.

NECKTIES AND SUSPENDERS—GENERAL CONDITIONS.

Forty girls employed. Work from 8 A. M. to 5:30 P. M.; average, about \$7 per week. All work done by the piece. Many of the women take the work to their homes. Apprentices get \$2 50 to \$3 per week.

PAPER BOX FACTORY—GENERAL CONDITIONS.

No. 1. Number of girls employed, 22; boys, 4. Wages of girls range from \$3 to \$9 per week. Hours of labor, from 7:30 A. M. to 5:30 P. M.; half hour for lunch. Workroom large; well lighted; on the top floor of five-story building; a large, handsome brick building; four stairways and two elevators for fire escapes. Employés all look happy and contented; can sit or stand while at work; all speak kindly of employer and foreman; allowed to eat lunch on their work tables. All live at home, and bring lunch with them. One girl refused to give statement, and said their good condition would induce immigrants to come to this coast, and reduce their wages.

No. 2. Number of girls, 45; ages of girls, 14 to 20; wages of girls, \$3 to \$12 per week; average about \$8 to \$9 per week. Boys, 8; ages, 18 to 21; wages, \$5 to \$17 per week. Hours of labor 7:30 A. M. to 6 P. M. Most of the work is done by the piece; some of the boys and girls get paid by the week. Have one hour for lunch. Girls are very attentive to work.

PRINTING HOUSES—GENERAL CONDITIONS.

No. 1. Fourteen females employed. Hours of labor from 7:30 A. M. to 5:30 P. M.; half an hour for lunch. Wages from 25 cents to 30 cents per one thousand ems. Workroom clean, but not well ventilated; it is close to a market, the odors from which are offensive and injurious; there is but one water-closet, which is in a filthy condition.

No. 2. Seven females employed, from 18 to 24 years of age. Scale of prices, 30 cents per one thousand ems. Workroom on top floor, clean, good light, and well ventilated; separate water-closets.

No. 3. Nine females employed. Wages from 25 cents to 30 cents per one thousand ems. Workroom very small, dirty, and badly ventilated.

No. 4. Six females employed, from 16 to 22 years of age; no apprentices. Wages 35 cents per one thousand ems. Workroom small, but clean, and well ventilated.

No. 5. Four females employed, from 15 to 20 years of age. Wages, 30 cents per one thousand ems. Workroom small, well lit, but very dirty.

No. 6. Twenty females employed. Wages, 30 cents per one thousand ems. Workroom crowded, well lit, but not clean.

No. 7. Five females employed, and 4 boys. Wages, 25 cents per one thousand ems. Workroom clean, well ventilated, and separate water-closets.

No. 8. One girl employed. Workroom small, well lit, but not clean; water-closets very dirty; washing facilities bad.

No. 9. Six females employed. Wages, 30 cents per one thousand ems. Workroom small, and very dark; water-closets very filthy; no washing facilities.

No. 10. Two females employed. Wages, 30 cents per one thousand ems. Workroom large, good light, and well ventilated; separate water-closets.

SOAP FACTORY—GENERAL CONDITIONS.

- Three girls employed. Hours of labor from 7 A. M. to 5:30 P. M.; one hour for lunch. Average wages, \$5 per week; employed in boxing and wrapping soap.

SALT WORKS.

Four girls employed in sewing sacks and packing salt. Hours of labor from 7 A. M. to 5:30 P. M.; one hour for lunch. Average wages, \$6 per week.

STRAW HATS.

Ten girls employed sewing hats. Hours of labor from 8 A. M. to 5:30 P. M.; one hour for lunch. Work by piece; average about \$6 per week.

SALESWOMEN—GENERAL CONDITIONS.

Dry Goods.

No. 1. Three salesladies; \$10 per week. Hours of labor, 9 A. M. to 6 P. M. three days in the week; balance of week, work 9 A. M. to 9 P. M. No seats—standing compulsory.

Fancy Goods.

No. 2. Six salesladies. Hours, 8 A. M. to 6 P. M.; wages, average \$8. No seats—standing compulsory.

Ladies and Children's Underwear.

No. 3. Two salesladies. Hours, 8 A. M. to 10 P. M.; wages, \$5 per week. No seats—standing compulsory.

Gentlemen's Dry Goods.

No. 4. Three salesladies. Hours, 8 A. M. to 6 P. M.; wages, \$10 per week. No seats—standing compulsory.

Fancy Dry Goods Store.

No. 5. Ten salesladies. Hours, 8 A. M. to 6 P. M.; \$10 per week. No seats—standing compulsory.

Dry Goods and Cloaks.

No. 6. Seven salesladies in cloak department; average, \$12 per week. Hours of labor, 8 A. M. to 6 P. M. No seats—standing compulsory.

General Merchandise, Dry Goods, etc., Sacramento.

No. 7. Saleswomen dry goods department, lowest wages, \$20 per month; highest, \$62 50; average, \$39. Female clerks, lowest wages, \$20 per month; highest, \$50; average, \$28. Millinery saleswomen, \$40 to \$100 per month; average, \$56. Millinery trimmers and makers, \$25 to \$80 per month; average, \$47. All extra work that is done after the regular business hours is paid for at the rate paid for ordinary business time. Seats provided; all females can sit whenever they feel inclined.

Toys and Trinkets.

No. 8. Seven salesladies; wages, \$7 per week. Work 9 hours. No seats; standing compulsory.

Boots and Shoes.

No. 9. One saleswoman; wages, \$15 per week; one bookkeeper, \$15 per week. Work 12 hours. Allowed to sit down.

Candy Store.

No. 10. Eight salesladies; wages, \$7 per week. Hours, 7:30 A. M. to 6 P. M. Compelled to stand.

Flowers and Feathers.

No. 11. Eleven salesladies. Hours, 8 A. M. to 9 P. M.; one hour for lunch. Average, \$8 per week; lowest, \$6; highest, \$10 per week. No seats provided.

No. 12. Two salesladies. Hours, 8 A. M. to 8 P. M.; wages, \$5 and \$7 respectively. Sitting allowed.

Gloves and Parasols.

No. 13. Four salesladies; 9 hours work. Average, \$8 per week; highest, \$11; lowest, \$7. No sitting.

Books.

No. 14. Four salesladies; \$25 and \$30 per month. Hours, 8 A. M. to 9 P. M. Sitting allowed.

Fancy Goods.

No. 15. Two salesladies. Work from 8 A. M. to 9 P. M.; Saturday evenings, until 11 o'clock. Wages, \$1 per day. No sitting allowed.

Corsets.

No. 16. Twenty-five girls. Salesladies' wages, \$5, lowest; \$14 highest; average, \$8 per week; sewing women, lowest, \$6; highest, \$12; average, \$7 per week. Hours, 7 A. M. to 6 P. M. Sitting allowed.

Ladies' Underwear.

No. 17. Three salesladies; average, \$7 per week; 5 operators, \$7 per week. Hours, 8 A. M. to 6 P. M.; one half hour for lunch; none paid less than \$5 50. No sitting allowed.

Fancy Goods.

No. 18. Fifteen salesladies. Hours, 8 A. M. to 8 P. M. Wages, \$6 to \$12; average, \$7; during Christmas time, has 60 women employed. Standing compulsory.

Cloaks.

No. 19. Twenty-five women; 5 salesladies, 20 cloak and dressmakers. Salesladies are paid \$30 to \$60, and average \$40 per month. Allowed to sit.

SHIRT FACTORIES—GENERAL CONDITIONS.

No. 1. Two hundred girls employed, and 40 Chinamen employed as ironers. Wages of girls, from \$3 to \$8 per week. Hours of labor from 8 A. M. to 5:30 P. M.; half an hour for lunch. In answer to the question, "Do not the Chinese keep many women from industries like shirtmaking," etc., the manufacturer said: "On the contrary, the Chinese assist white women into them. They do not take work away from them; they give it to them. It was only by the aid of Chinese labor that the manufactories which now exist here were started. Fifteen years ago the price of white labor on this coast precluded the possibility of manufacturers here competing with eastern manufacturers. Cheaper labor was supplied in the Chinese, and by using them we, in common with others, were enabled to start factories. I venture the assertion that 75 per cent of the manufacturing industries on this coast owe their existence to Chinese labor. The manufacturers employed them exclusively at first, but gradually white people were worked in, and at present there are probably a great many more white than Chinese employed in the service of white manufacturers in this city." The factory is a model of neatness, well lit and ventilated. The sanitary condition is excellent, and the males and females work in separate apartments. Number of Chinese, 75; number of girls, 25; wages of girls, \$6 to \$14 per week, at shirt making; wages of girls sewing by hand, \$2 50 to \$8 per week; wages of girls making button holes on machine, \$12 to \$15. Ages of females, from 18 upwards; mostly over 35. Separate closets provided for the sexes. Good experienced girls are greatly in demand—could find employment for a great many if they could only be obtained. Most of the work is done by piece. Machinery is used mostly, even in cutting and sewing the button holes in the lower grade of shirts, when from 800 to 1,000 button holes can be cut and sewn in one day. Chinese do the washing, ironing, and starching. Cuffs and collars are ironed by machinery.

SILK FACTORIES—GENERAL CONDITIONS.

No. 1. Number of girls, 57; boys, 5. Hours per day, 10; half hour for lunch. Wages of girls, \$5 75 per week; beginners, \$3 75. Articles manufactured, silk thread. About five years ago this factory started with about two girls. It costs about \$7 per pound to raise silk here, while it can be imported for \$6. The girls can fill about 3,000 spools each per day. The trade is local, shipping not further than Utah and a little to Australia. Most of the machinery was manufactured in Connecticut. Wages are paid monthly, but advances will be made to any of the employes. The weight of silk loses about four ounces, or falls from sixteen to twelve ounces by the dyeing process.

No. 2. Ten girls; youngest, 13 years; four are 14; two are 17; one 15; one 16. One 17-year old girl is employed on the winder and at the vat; gets \$5 25 per week; is forewoman. Two girls get \$3; three get \$3 25; three get \$4 25. The \$3 girls are on the cotton frame; \$3 25 on raw silk winder; \$4 25 on doubler and reeler. Hours of labor, 7 A. M. to 5:30 P. M.; half hour for lunch. All are given \$2 per week to start on, which, after three weeks, is gradually increased to \$4 50, etc. Workshop is small; located on the third floor of an immense frame building, a carpet cleaning establishment occupying the other upper floor, and the ground floor is occupied by a livery stable. The appearance of the place is anything but inviting, being filled with a lot of machines, dyeing vats, and apparatus.

No. 3. Pacific Silk Factory, San José. Organized 1882. Articles manufactured, silk cloth. There are 21 looms and 21 men and women employed in weaving. Wages, about \$1 50 per day; all paid by piece. Each makes 14 yards of silk per loom per day, for light goods. The retail price is \$1 25 to \$1 50 per yard. Capacity of ten power looms, 126 yards daily. There are seven looms run by hand power, the rest by steam. The factory makes 6 to 8 yards daily of heavy goods. Gross grain and satin weavers earn \$1 50 to \$2 per day, according to skill. The factory is a small frame structure; rather crowded, but plenty of light and ventilation.

TOBACCO AND CIGAR FACTORIES—GENERAL CONDITIONS.

No. 1. Fifty girls and 20 boys and 200 Chinamen employed. Ages of girls from 16 to 23. Hours of labor from 7:30 A. M. to 5:30 P. M. Chinese paid by piece, earning from \$6 to \$10 per week; girls earn from \$4 to \$9, and boys from \$5 to \$12 per week. Workshop on upper floor, well lit and ventilated.

No. 2. Four girls, 2 boys, and 40 Chinese employed. Ages of girls, from 15 to 20. Hours of labor from 8 A. M. to 5 P. M. Girls earn from \$4 50 to \$5, and boys from \$4 50 to \$5 50 per week. Only one water-closet on premises.

No. 3. Six girls, 5 white men, and 100 Chinese employed. Ages of girls, from 14 to 20. Hours of labor from 7 A. M. to 6 P. M. Wages of girls from \$1 to \$6; of men, \$10 to \$12, and of Chinese, \$6 to \$15 per week. Workroom large and well ventilated, on second floor. Girls work in same room with Chinese.

No. 4. Thirty-five girls and 80 Chinese employed. Ages of girls, from 17 to 26. Hours of labor from 7:30 A. M. to 5:30 P. M. Girls earn from \$4 to \$6, and Chinese from \$6 to \$12 per week. Girls work in the same room with Chinese, but have separate water-closets.

No. 5. Twelve girls, 2 boys, and 40 men employed; no Chinese. Ages of girls, from 18 to 25. Hours of labor from 7 A. M. to 5 P. M. Girls earn from \$6 to \$8 per week. All work done by the piece. Girls employed in stripping, while one girl is making cigars. Workshop well lit and well ventilated.

No. 6. No girls, 10 boys, and 120 Chinese employed. Ages of boys, from 14 to 21. Wages from \$5 to \$7 per week; Chinese earn from \$7 to \$15 per week. The firm does not employ girls because they found them too troublesome; they had to be watched closely to see that they attended to their work.

No. 7. No girls, 8 men, and 60 Chinese employed. Men earn from \$10 to \$14 per week; Chinese from \$5.50 to \$10. Firm does not employ girls owing to their immoral tendencies. The technical school for training boys and girls to make cigars was a failure, owing to the hoodlum disposition of those engaged.

No. 8. Cigarettes—20 girls and 5 boys employed. Ages of girls, from 17 to 28; boys, 18 to 25. Hours of labor from 7:30 A. M. to 5:30 P. M. Wages of girls, \$1 to \$1.50 per day, and of boys from \$5 to \$10 per week. In cigarette making the demand exceeds the supply. All work is done by the piece. A girl who is a good worker can make about 2,500 cigarettes per day at 60 cents per thousand. Workshop well lit and well ventilated. Girls can come and go when they please.

No. 9. Cigars—17 girls, 6 boys, and 77 men employed; no Chinese. Eight hours a day's work. One hundred and thirty thousand dollars worth of cigars manufactured last year. Capital invested, \$70,000. Amount paid for labor during the past twelve months, about \$48,000. This is a model establishment, clean, well lit, and ventilated, separate water-closets, etc. Employés are treated with kindness and consideration.

No. 10. This cigar factory is known as the Pacific Coast Coöperative Cigar Manufacturing Company. Capital stock, \$20,000; value of cigars manufactured last year, \$25,000; paid for labor, \$10,353.56; number of men employed, 15; number of women employed, 3. Men average \$15.40 per week, working by the piece at union rate. Women average \$6 per week. No boys are employed. Eight hours constitute a day's work. The workroom is large, airy, and has good light. As this factory is one of the very few coöperative enterprises which has been successful in California, it is well to publish its history, which was kindly furnished by the Secretary of the company, Mr. Henry Knobel.

Pacific Coast Coöperative Cigar Manufacturing Company.

The Pacific Coast Coöperative Cigar Manufacturing Company was incorporated under the laws of the State of California July 14, 1886. This institution, like most of those of a similar nature, is the offspring of necessity. During the year 1886, through the agitation of the Chinese question, the conflict between "white labor" and "Chinese labor" reached its climax. Labor organizations all over the coast inaugurated a "boycott" against all employing Chinese labor in any capacity, extending it even to those employing Chinese as house servants or laborers. The crusade was also conducted against those using goods manufactured by the Chinese.

The cigar manufacturers of San Francisco, alarmed into action by a repudiation of their Chinese-made cigars, so general as to threaten their commercial ruin, sent East, through the Cigarmakers International Union, No. 228, for cigarmakers, promising them permanent work under the Union scale of prices. One of these manufacturers, William Lewis by name, could not wait the tardy action of the mails, and telegraphed to Buffalo, New York, for 100 men. The present members of the "Pacific Coast Coöperative Cigar Manufacturing Company" were partially of this unfortunate contingent, known as "The Bill Lewis 100." Acting with his customary (?) good faith, Lewis discharged his white cigarmakers, after from one to four months employment, notwithstanding he had engaged them on a year's contract. Finding themselves without work, with little money, and no disposition to starve, nine of the unfortunates allied themselves with the proprietor of a small factory, and under the leadership of George Fleishman (the foreman of the Coöperative Cigar Manufacturing Company of Albany, New York), organized and incorporated this factory. The company originally consisted of ten members, with a capital stock of \$10,000, divided into ten shares, of \$1,000 each. After an existence of about ten months the company was involved in an expensive and lengthy litigation with one of its recalcitrant members. His object was to either gain his point or kill the institution. It is, perhaps, needless to say that he failed utterly in realizing either of his ends. The company came out of the strife victorious, though having sustained some loss through its interrupted business, which covered a period of some two months.

Since its establishment, also, two dissatisfied members have withdrawn from the company, and their stock has been purchased by those more recently allied with the company. This change has been fortunate for the institution, as it has gained good and willing co-workers, and lost the only element which threatened its disruption.

In the month of December, 1887, the company increased its capital stock to \$20,000, divided into twenty shares of \$1,000 each. It, at this time, took in seven new members, each purchasing a share of the company's stock. Within the history of the company,

thus far, no insuperable obstacles have been met with, and its advancement has been continuous and uninterrupted. No institution of its kind anywhere can point to the record of its past with more pride, or scan its future with less fear or with greater assurance of a rich reward for the arduous labors the projectors suffered during the first few months of its existence, and for their heroic self denial, which has, after all, been the chief factor in the solution of this problem.

The officers of the company consist of a President, Vice-President, Secretary, Treasurer, and Board of Directors of ten members. The officers are elected at the annual meeting of the stockholders in January of each year.

The corporate power of the company is vested in the Board of Directors, who have full control of the business of the company, and employ a manager, who has charge of the manufacturing portion of the business, and has full control of the factory. The manager employs all cigarmakers, packers, strippers, etc., and has power to discharge any such at any time when their work is not satisfactory. Stockholders who may be working in the factory have the right of appeal to the Board of Directors in all cases where they have any grievances, and the decision of the Board of Directors is final.

The manner of paying up the shares is perhaps best described by the following articles from the By-laws:

ARTICLE I. All stock of this corporation shall be subject to assessment until fully paid up.

ART. II. The assessment upon each share of stock shall be twenty dollars per month until fifty per cent of the par value of said share of stock shall have been paid, and thereafter the assessment upon each share of stock shall be ten dollars per month, until the par value of each share of stock shall be fully paid up.

ART. III. Stockholders who are engaged in laboring for or in conducting the business operations of the corporation may pay assessments upon their stock either in *said labor or in cash, as they may prefer.*

Upon the failure of any stockholder to pay his assessment within thirty days after it is due and payable, he shall be deemed delinquent, and his share of stock shall be disposed of in accordance with the statutory provisions as laid down in the Civil Code of California, at any time after such delinquency, as the Board of Directors may choose to order.

TYPE, WOOD CUTS, AND PRINTERS' SUPPLIES—GENERAL CONDITIONS.

Number of women, 45; boys, 10; and men, 30. All time workers. Wages paid to type casters (weekly average), \$15; stereotypers, \$15; wood engravers, \$15; women engaged in breaking and rubbing, \$7 50; boys are paid from \$3 to \$9 per week. Hours of labor from 7 A. M. to 6 P. M.; an hour for lunch. Wood engravers work only eight hours per day. Workroom large, well lit, and well ventilated.

TYPE FOUNDERS—GENERAL CONDITIONS.

Three women, 3 boys, and 10 men employed. Apprentices are paid from \$3 to \$7 per week; electrotypers and stereotypers average \$21 per week; women earn about \$9 per week.

TENTS, DUCK, BAGS, ETC.—GENERAL CONDITIONS.

No. 1. Sixty-two women employed. Time workers get \$7 50 per week; piece workers average \$9 per week. Many of the females are mere children, aged from 9 to 11 years. Work nine hours in winter, and ten hours in summer. Children get \$2 50 per week; they are merely helpers. Workshop is large, occupying third floor of building; the fire escapes are very poor; separate water-closets are provided for the girls.

No. 2. Fifty girls employed. Average about \$6 50 per week; mostly piece workers.

MANUFACTURE OF UNDERWEAR, OVERALLS, ETC.—GENERAL CONDITIONS.

No. 1. Seventy-five girls and women employed. Wages all piecework; 60 cents a dozen for lowest class of shirts; average from \$3 to \$10 per week. Hours from 7:30 A. M. to 5:30 P. M.; lunch, one hour. Workroom on top floor; well lit and ventilated; no separate water-closets; fire escape, stairs, and elevator.

No. 2. Let out work (sewing). Boys' blouses, 80 cents per dozen, and aprons 25 cents per dozen. Three women sewing for him now. One woman and her mother together manage to make 80 cents per day on above work. Store cold and dirty, and sewerage bad. One girl worked seven years as operator on machine; gets \$8 per week.

No. 3. Three girls employed; ages, 16 to 23. Wages: one who has worked seven months at trade gets \$3 50 per week; another experienced hand gets \$3 per week; highest wages paid, \$6; lowest wages paid, \$1. Hands must work a week gratis before wages are paid. One Japanese operator and one new operator. Hours from 7:30 A. M. to 6 P. M.; one hour for lunch. Workroom small and dirty; tobacco smoking all day; boss lives in rear; smell of cooking very bad.

No. 4. Four girls employed. One girl gets \$8 per week; does fine work; the others get from \$3 to \$5 per week. Ten hours' work per day. Workroom small and dirty.

No. 5. Seven girls employed; ages, 14 to 35. One girl apprentice; must work four weeks gratis. Necktie department has 5 girls. Piecework, 30 cents per dozen. One girl who has worked six weeks receives \$3 50 per week; one woman gets \$3 per week. In a department where bed comforters are made there are two women; piecework, seven for \$1; earn about 85 cents to \$1 or \$1 25; work very laborious. Hours from 8 A. M. to 6 P. M.; one

hour for lunch. First room badly ventilated; fairly lighted; second room dark and dirty. Closet filthy; no washing facilities.

WAITER GIRLS—GENERAL CONDITIONS.

No. 1. Girls working, 10; nine waiters and one cash girl. Hours of labor, 7 A. M. to 8 P. M.; two hours and a half off every other afternoon. Wages average \$6 per week and board.

No. 2. Two girls working; one receives \$6 per week, and the other \$7 and board. Work from 6:30 A. M. to 6:30 P. M.; they have one half day off once a week. Girls iron napkins.

No. 3. Three girls working. Wages, \$6 per week and board. Work from 6:30 A. M. to 6:30 P. M. Girls do all the cleaning.

No. 4. Twelve girls working. Hours of labor from 6:30 A. M. to 6:30 P. M. Wages average \$7 a week and board.

No. 5. Three girls. Ten hours work. Wages \$6 a week and board.

No. 6. Nine girls. Twelve hours work. Wages, \$6 a week and board. Wash and iron napkins.

WOODEN BOX FACTORY—GENERAL CONDITIONS.

No. 1. Manufacturing fruit, berry, grape, and all kinds of packing boxes. Number of employes: Men, 40; women and girls, 20; boys, 30. Hours, 7 A. M. to 5:30 P. M.; half hour for lunch. Wages, foreman, \$4 per day; machine, \$3; men, \$2 25 per day; boys, 75 cents to \$1 50 per day; girls are paid by the piece, and average \$1 50 per day; experienced women earn \$2 per day. Ages of boys from 15 to 18.

No. 2. Make boxes for fruit, and all kinds of merchandise, also washboards. Number of employes: Men, 30; girls, 5; boys, 15; Chinamen, 3. Hours, 7 A. M. to 6 P. M.; half hour for lunch. Wages of men from \$1 50 to \$2 75 per day; girls from \$3 to \$5 per week; boys from 75 cents to \$1 25 per day, average \$1. Boys are from 12 to 16 years of age. Firm connected with Towle Bros., of Placer County, where lumber comes from.

WOOLEN FACTORIES—GENERAL CONDITIONS.

No. 1. All kinds of woollen goods are manufactured in this establishment. Employes: One hundred females, 15 boys, 300 men, and 200 Chinese. Hours of labor, 7 A. M. to 12 M., and from 12:30 to 6:30 P. M. Saturday they work until 4:15 P. M. Hours employed for entire week, 63 hours 45 minutes. Rate of wages as follows:

Occupation.	Class of Worker.	Rate per Day.
Carders	First overseer	\$5 00
Carders	Second overseer	3 00
Carders (white men)	Cleaners	1 50
Carders (Chinese and boys; boys, 15 to 18 years of age)	Tenders	1 00
Dressers	Overseer	4 00
Dressers (Chinese)	Tenders	1 25
Dressers (white men)	Tenders	1 75
Spoolers (white girls, 15 to 18 years of age; piece work) .....	.....	1 00
Spinners	Overseer	4 00
Spinners	Second overseer	3 00
Spinners	Fixers	2 50
Spinners (white men; piece work) .....	.....	2 00
Spinners (white boys, 15 to 18 years of age) .....	.....	\$1 to 1 25
Spinners (Chinese) .....	.....	1 00
Weavers	Overseer	5 00
Loom fixers .....	.....	2 50
Weavers (fancy looms; all piece work) .....	.....	2 00

This is for weaving cassimeres for men's wear, and is done by both men and women. Plain goods, such as blankets, flannels, and ladies' dress goods, are done both by white and Chinese, by piece work.

No. 2. This factory is large, well lit and ventilated; sanitary conditions and surroundings very good and healthy. In cleaning and scouring wool Chinese are principally employed. In the weavingroom, the Chinese are on one side, and white girls on the other. The number of employes, and wages paid, are classified as follows:

OCCUPATION.	NUMBER OF EMPLOYÉS.			AVERAGE DAILY WAGES.		
	Males.	Females.	Chinese.	Males.	Females.	Chinese.
Bobbin carriers	1					
Burlers		25			\$0 90 to 1 00	
Carders	3	9	7	\$1 50 to 1 75	90	\$1 00
Drawers in			3			1 00
Dressers	1			2 50 2 00		
Dyers	4			to 2 50		
Engineer	1			5 00		
Firemen	1			2 50		
Finishers	13			1 25 to 3 00		
Fullers	1		2	3 50		1 10
Giggers			7			1 00
Laborers	1			2 00		
Loom fixers	1			3 00		
Machinist	1			3 00		
Overseers	6			4 00 to 5 00		
Packers			1			1 00
Pressers			1			1 00
Scourers	6		5	2 00		1 10
Shearers	1			2 75		
Spinners mule	6		4	1 00		80 to 90
Spoolers		5			85 to 90	
Spool carriers	1		1	1 25		90
Teamsters	1			2 50		
Watchmen	2			2 50		
Weavers		20	6		1 50	1 00
Wool sorters	3		2	2 50		1 20
Total number of workers	54	59	39			

No. 3. Employés, 40 men and 40 women. Weavers paid by piecework, and average \$35 per month; lowest wages paid, 75 cents per day; burlers, 90 cents per day. Profit sharing exists here, and details are posted in the workshop. The first \$24,000 of profit goes to the company; the next \$4,000 is to be distributed to employés; all profits above the \$28,000 go to the company; one girl said she received in this way \$56 in one year. Only two girls, out of the forty employed, board; the rest live at home. Rent and fuel higher than in the East; food and clothing about the same; wood, \$9 per cord. If any employé leaves without notice he loses all profit sharing.

No. 4. Number of girls, 12; ages of girls, 16 to 24; wages, 75 cents to \$1 45; spooling girls get 75 cents per day. Weavers get from \$1 25 to \$1 45, by piece. Hours, 11 per day, or 65 per week. Boys, about 10 in number; ages, 13 to 15; work 11 hours per day; on the carding machine, boys get 75 cents per day; on the second brake and on the third, or finisher, boys get 60 cents per day, work 11 hours; boys helping around get 75 cents per day; the spinners (boys) get 18 cents for 100 runs, and average 600 or 700 runs daily, \$1 10 for work of 11 hours. The dyer gets \$2 50 per day; finisher, \$3; second hand, \$2; third and fourth, \$1 75; scourers, dyers, preparers, etc., get \$1 75 per day. Hours, 6 A. M. to 5 P. M. Weavers are the only ones paid by the piece; average \$35 per month.

No. 5. Number of men employed, 12; women, 12. The following are the rates of wages paid: In the sorting and scouring department, males earn from \$1 to \$1 50 per day; females earn from \$1 25 to \$1 50 per day; in the carding and picking room, men get \$1, \$1 25, and \$1 50 per day; in spinning and spooling, one man gets \$2 50, and women and girls get \$1 per day; in weaving department, employés are paid by the piece—women average \$7 50 per week; overseer is paid \$2 50 per day; dressers (women), \$1 50 per day; finishers (men), \$2 per day; assistant, \$1 50 per day. Hours of labor, 11 hours per day.

No. 6. Number of men employed, 9; women, 8; boys, 4; and one girl; no Chinese. Wages of men, from \$1 50 to \$4 per day; women (piecework), from \$33 to \$47 per month; boys get \$1 and \$1 25 per day. Hours of labor, 11 hours per day. Mill is small, and well lit and ventilated, but not kept clean.

No. 7. There are about 50 women employed in the weaving department who can earn from \$1 25 to \$1 50 per day. It takes a girl three or four weeks to learn sufficient to earn wages. The factory buildings and grounds cover two blocks. The main building is four stories high, and has a frontage of 383 feet and a depth of 65 feet. The machine shop is complete in all its appointments. The wings are 100 feet in depth. All the work rooms are well lit and ventilated. Separate water-closets are provided for the sexes. There is room for improvement in the way of cleanliness, but this is invariably the case where a number of Chinese are employed. Access to the factory is difficult, and the surroundings are not pleasant. There are but few cottages and tenements in the neighborhood, and they are neither clean looking nor desirable. Employés complain of the shortness of time (half an hour) allowed for lunch, and say it should be extended to three quarters in order to give them time to reach their homes. Otherwise no complaint has been made against the management. As an evidence that it must be satisfactory to the employés, nearly all the foremen at present have been advanced to their present positions from the lowest grades. Employés have to pay for rent of rooms and cottages from \$15 to \$25 per month. In the neighborhood of eastern woolen mills they could rent the same accommodations for half that sum. Wages paid are classified as follows:

OCCUPATION.	Class of Workers.	Rate per Day.
Weavers (white girls and boys) make from.....		\$1 25 to \$1 50
Weavers (Chinese) make from.....		1 to 1 25
Wool sorters.....	Overseer.....	4 00
Wool sorters (white men), piece work.....		2 50
Wool sorters (Chinese), day work.....		1 00
Wool scourers (Chinese).....		1 10
<i>Finishing Department.</i>		
	Overseer.....	4 00
Shear tenders (white).....		1 50
Cloth menders (girls).....		1 25
Cloth burlers (girls).....		90 to 1 00
Fullers.....	Overseer.....	4 00
Common help (white men).....		1 50 to 1 75
Giggers.....		1 50
Scourers.....		1 50
Dyers.....	Overseer.....	7 00
Dyers.....	Second overseer.....	4 50
Help (all white men).....		1 50 to 1 75
<i>Engine Room.</i>		
Engineer and machinist.....	Overseer.....	5 00
Ordinary machinists.....		3 00 to 3 50
Blacksmith.....		3 75
Blacksmith helper.....		2 00
Outdoor day laborers.....		1 50 to 1 75
Firemen.....		3 00

EXPLANATORY.

Subdivision 1, Table "A," Subdivision 2, Table "B," and Subdivision 3, of this Chapter, are correlative and show conditions of three different kinds of the same female wage earners.

For instance, the workingwoman No. 1, in the first Table (A), is the same person under the same number in the second Table (B), and is the same person under the same number in Subdivision 3.

So that in any line of business here enumerated, if in reading the "working" conditions of any female, you want to know the "personal and financial" or the "home" conditions of the same person, you must turn to these subdivisions and see corresponding trade and number.

CHAPTER II—SUBDIVISION I.

TABLE A.
TABLES SHOWING "WORKING" CONDITIONS OF WORKINGWOMEN.

Number	Occupation.	Work by Time	Work by Piece	Price per Piece.	Highest Weekly Wages	Lowest Weekly Wages	Average Weekly Wages	Begin Work At	Close Work At	Lunch—Minutes	CONDITION OF WORKROOM.				State of Health.
											Sanitary, etc.	Facilities for Washing	Facilities for changing Clothes	Separate Closets Water	
	<i>Bookbinding.</i>														
1	Forewoman	1			\$12 00	\$12 00	\$12 00	8:00	6:00	60	Clean, bright and airy;	Yes.	Yes.	Yes.	Good.
2	Bookbinding	1			10 00	3 00	10 00	8:00	6:00	60	steam machinery	Yes.	Yes.	Yes.	Good.
3	Bookbinding	1			10 00	8 00	10 00	8:00	6:00	60	"	Yes.	Yes.	Yes.	Good.
4	Bookbinding	1			13 00	8 00	8 00	8:00	6:00	60	"	Yes.	Yes.	Yes.	Good.
5	Bookbinding	1			7 50	3 00	7 50	8:00	6:00	60	"	Yes.	Yes.	Yes.	Good.
6	Bookbinding	1			7 50	7 50	7 50	8:00	6:00	60	"	Yes.	Yes.	Yes.	Good.
7	Bookbinding	1			8 00	2 00	8 00	8:00	6:00	60	"	Yes.	Yes.	Yes.	Good.
8	Bookbinding	1			8 00	3 00	8 00	8:00	6:00	60	"	Yes.	Yes.	Yes.	Good.
9	Bookbinding	1			7 50	7 50	7 50	8:00	6:00	60	"	Yes.	Yes.	Yes.	Good.
10	Bookbinding	1			8 00	7 00	8 00	8:00	6:00	60	"	Yes.	Yes.	Yes.	Good.
11	Booksewing	1			9 00	3 00	9 00	8:00	6:00	60	Workroom on second	Poor.	No.	Yes.	Good.
12	Booksewing	1			9 00	3 00	9 00	8:00	6:00	60	floors, large, well lit,	Poor.	No.	Yes.	Good.
13	Booksewing	1			5 00	3 00	5 00	8:00	6:00	60	and ventilated; stairs	Poor.	No.	Yes.	Good.
14	Booksewing	1			8 00	5 00	7 00	8:00	6:00	60	only fireescape; steam	Poor.	No.	Yes.	Good.
15	Booksewing	1			5 00	5 00	5 00	8:00	6:00	60	machinery	Poor.	No.	Yes.	Good.
16	Type ruling	1			4 00	4 00	4 00	8:00	6:00	60	"	Poor.	No.	Yes.	Good.
17	Type ruling	1			4 00	4 00	4 00	8:00	6:00	60	"	Poor.	No.	Yes.	Good.
	<i>Boot and Shoemakers.</i>														
1	Shoe fitter	1			12 00	3 00	10 50	8:00	5:30	30	Good light, well venti-	Good.	Yes.	Yes.	Good.
2	Shoe fitter	1			3 00	2 00	3 00	8:00	5:30	30	lated; workroom on	Good.	Yes.	Yes.	Good.
3	Shoe fitter	1			11 00	5 00	9 00	8:00	5:30	30	top floor three-story	Good.	Yes.	Yes.	Good.
4	Shoe fitter	1			15 00	4 00	10 00	8:00	5:30	30	building	Good.	Yes.	Yes.	Good.
5	Shoe fitter	1			12 00	10 00	10 00	8:00	5:30	30	"	Good.	Yes.	Yes.	Good.
6	Shoe fitter	1			12 00	4 50	10 50	7:30	5:30	30	"	Good.	Yes.	Yes.	Good.
7	Shoe fitter	1			11 50	3 00	8 00	7:30	5:30	30	"	Good.	Yes.	Yes.	Good.
8	Shoe fitter	1			5 50	2 50	4 50	7:30	5:30	30	"	Good.	Yes.	Yes.	Good.

9	Shoe fitter	1	1	10 00	4 00	9 00	7 30	5 30	30	Large on top floor; elevator and stairs for fire escapes.	Poor.	No.	Yes.	Good.
10	Shoe fitter	1	1	13 00	3 50	9 00	7 30	5 30	30	"	Poor.	No.	Yes.	Good.
11	Shoe fitter	1	1	9 00	5 00	8 00	7 30	5 30	30	"	Poor.	No.	Yes.	Good.
12	Shoe fitter	1	1	8 00	5 00	8 00	7 30	5 30	30	"	Poor.	No.	Yes.	Good.
13	Shoe fitter	1	1	16 00	8 00	10 00	7 30	5 30	30	"	Poor.	No.	Yes.	Good.
14	Shoe fitter	1	1	12 50	3 00	11 00	7 00	5 30	45	Large, plenty of light and air; stairs only for fire escape.	Good.	Yes.	Yes.	Good.
15	Shoe fitter	1	1	8 00	4 00	7 50	7 00	5 30	45	"	Good.	Yes.	Yes.	Fair.
16	Shoe fitter	1	1	7 00	3 00	7 00	7 00	5 30	45	"	Good.	Yes.	Yes.	Good.
17	Shoe fitter	1	1	9 50	3 00	7 50	7 00	5 30	45	"	Good.	Yes.	Yes.	Good.
18	Shoe fitter	1	1	12 00	4 00	10 50	7 00	5 30	45	"	Good.	Yes.	Yes.	Good.
19	Shoe fitter	1	1	15 00	4 00	12 00	7 00	5 30	45	"	Good.	Yes.	Yes.	Good.
20	Shoe fitter	1	1	7 50	7 50	7 50	7 00	5 30	45	"	Good.	Yes.	Yes.	Good.
21	Shoe fitter	1	1	10 00	10 00	10 00	7 30	5 30	30	Large, well lit and ventilated; fire escape bad.	Good.	Yes.	Yes.	Good.
22	Shoe fitter	1	1	4 50	3 00	4 50	7 30	5 30	30	"	Good.	Yes.	Yes.	Bad.
23	Shoe fitter	1	1	10 00	3 00	10 00	7 30	5 30	30	"	Good.	Yes.	Yes.	Good.
24	Shoe fitter	1	1	3 00	2 00	3 00	7 30	5 30	30	"	Good.	Yes.	Yes.	Fair.
25	Shoe finishers	1	1	7 00	3 00	7 00	7 30	5 30	30	"	Good.	Yes.	Yes.	Not good.
26	Shoe finishers	1	1	4 50	2 00	3 50	7 30	5 30	30	"	Good.	Yes.	Yes.	Good.
27	Shoe finishers	1	1	6 00	4 00	6 00	7 30	5 30	30	"	Good.	Yes.	Yes.	Good.
28	Shoe finishers	1	1	6 50	4 50	6 00	7 30	5 30	30	"	Good.	Yes.	Yes.	Good.
29	Shoe finishers	1	1	6 00	4 50	5 50	7 30	5 30	30	"	Good.	Yes.	Yes.	Fair.
30	Shoe finishers	1	1	6 50	5 00	6 00	7 30	5 30	30	"	Good.	Yes.	Yes.	Good.
31	Shoe paster	1	1	13 00	6 00	9 00	7 30	5 30	30	"	Good.	Yes.	Yes.	Good.
32	Shoe paster	1	1	6 50	2 50	6 50	7 30	5 30	30	"	Good.	Yes.	Yes.	Good.
33	Shoe paster	1	1	7 00	5 00	6 50	7 30	5 30	30	"	Good.	Yes.	Yes.	Fair.
34	Shoe paster	1	1	7 50	6 00	7 00	7 30	5 30	30	"	Good.	Yes.	Yes.	Good.
35	Turner and trimmer	1	1	9 50	2 00	8 00	8 00	5 30	30	"	Good.	Yes.	Yes.	Good.
36	Turner and trimmer	1	1	7 00	4 00	6 00	8 30	5 30	30	"	Good.	Yes.	Yes.	Fair.
37	Turner and trimmer	1	1	8 00	6 00	7 00	8 00	5 30	30	"	Good.	Yes.	Yes.	Good.
38	Turner and trimmer	1	1	7 50	6 00	6 50	8 00	5 30	30	"	Good.	Yes.	Yes.	Good.
39	Sock liner	1	1	3 00	3 00	3 00	7 30	5 30	30	"	Good.	Yes.	Yes.	Good.
40	Outside stitcher	1	1	14 00	4 00	11 00	8 00	5 30	30	"	Good.	Yes.	Yes.	Good.
41	Outside stitcher	1	1	12 00	7 00	8 00	7 30	5 30	30	"	Good.	Yes.	Yes.	Fair.
42	Stoger	1	1	11 00	11 00	11 00	8 00	5 30	30	"	Good.	Yes.	Yes.	Good.
43	Stoger	1	1	12 00	9 00	10 00	7 30	5 30	30	"	Good.	Yes.	Yes.	Good.
44	Buttonhole maker	1	1	18 00	6 00	10 00	8 00	5 30	30	"	Good.	Yes.	Yes.	Good.
45	Buttonhole maker	1	1	25 50	5 00	10 00	7 30	4 45	30	"	Good.	Yes.	Yes.	Very poor.
46	Buttonhole maker	1	1	20 00	8 00	12 00	8 00	5 30	30	"	Good.	Yes.	Yes.	Good.
47	Buttonhole maker	1	1	10 00	7 00	7 00	8 00	5 30	30	"	Good.	Yes.	Yes.	Fair.
48	Buttonhole maker	1	1	6 00	4 00	6 00	8 00	5 30	30	"	Good.	Yes.	Yes.	Good.
49	Shoe finisher	1	1	6 00	4 00	6 00	8 00	5 30	30	"	Good.	Yes.	Yes.	Good.

NOTE.—For "personal and financial" and "home" conditions of the same person, see corresponding number in Subdivision 2, Table "B," and Subdivision 3.

TABLE A—Continued

Number	Occupation.	Work by Time	Work by Piece	Price per Piece.	Highest Weekly Wages	Lowest Weekly Wages	Average Weekly Wages	Begin Work At	Close Work At	Lunch—Minutes	CONDITION OF WORKROOM.				State of Health.		
											Sanitary, etc.	Facilities for Washing	Facilities for changing Clothes	Separate Closets		Water	
	<i>Candy-makers.</i>																
1	Candy-making	1			\$10 00	\$5 00	\$10 00	7:45	6:00	30	Workroom in basement; gloomy, dark, and cold.	Yes.	No.	No.	No.	Fair.	
2	Candy-making	1			10 00	5 00	10 00	7:45	6:00	30	"	Yes.	No.	No.	No.	Good.	
3	Candy-making	1			10 00	5 00	10 00	7:45	6:00	30	"	Yes.	No.	No.	No.	Good.	
4	Candy-making	1			9 00	3 00	6 00	7:00	5:30	30	Workroom small, but well lit and ventilated.	Yes.	No.	No.	No.	Good.	
5	Candy-making	1			6 00	2 00	4 00	7:00	5:30	30	"	Yes.	No.	No.	No.	Good.	
6	Candy-making	1			6 00	4 00	5 00	7:00	5:30	30	"	Yes.	No.	No.	No.	Poor.	
7	Candy-making	1			5 00	3 00	4 00	7:00	5:30	30	"	Yes.	No.	No.	No.	Good.	
	<i>Chocolate Factory.</i>																
1	Packing chocolate.	1			6 00	5 00	6 00	7:00	5:45	45	Good light and ventilation; first floor; can sit or stand	Yes.	No.	No.	No.	Good.	
2	Packing chocolate.	1			6 00	6 00	6 00	7:00	5:45	45	"	Yes.	No.	No.	No.	Good.	
3	Packing chocolate.	1			6 00	4 00	6 00	7:00	5:45	45	"	Yes.	No.	No.	No.	Good.	
	<i>Cigarmakers.</i>																
1	Strippers	1			4 00	3 00	4 00	7:30	5:30	50	Large room; well lit and ventilated	Yes.	No.	Yes.	Yes.	Good.	
2	Strippers	1			5 50	4 50	5 00	7:30	5:30	50	"	Yes.	No.	Yes.	Yes.	Good.	
3	Strippers	1			5 00	5 00	5 00	7:30	5:30	50	"	Yes.	No.	Yes.	Yes.	Good.	
4	Strippers	1			4 50	4 50	4 50	7:30	5:30	50	"	Yes.	No.	Yes.	Yes.	Good.	
5	Strippers	1			5 00	5 00	5 00	7:30	5:30	50	"	Yes.	No.	Yes.	Yes.	Good.	
6	Strippers	1			6 50	5 00	5 00	7:30	5:30	50	"	Yes.	No.	Yes.	Yes.	Poor.	
7	Strippers	1			5 50	4 00	5 50	7:30	5:30	50	"	Yes.	No.	Yes.	Yes.	Good.	
8	Strippers	1			7 00	5 00	7 00	7:30	5:30	50	"	Yes.	No.	Yes.	Yes.	Good.	
9	Strippers	1			5 50	5 00	5 50	7:30	5:30	60	Large room; bad ventilation and drainage	Yes.	No.	No.	Yes.	Fair.	
10	Strippers	1			5 00	5 00	5 00	7:30	5:30	60	"	No.	No.	No.	No.	Bad.	
11	Strippers	1			5 00	5 00	5 00	7:30	5:30	45	Small room, well lit; offensive odors from Chinese and neighborhood	Poor.	No.	Yes.	Yes.	Good.	
12	Strippers	1			4 00	3 00	4 00	7:30	5:30	45	"	Poor.	No.	Yes.	Yes.	Good.	
13	Strippers	1			4 00	3 00	4 00	7:30	5:30	45	"	Poor.	No.	Yes.	Yes.	Good.	
14	Strippers	1			4 00	4 50	5 00	7:30	5:30	45	"	Poor.	No.	Yes.	Yes.	Fair.	
15	Strippers	1			5 00	4 00	4 00	7:30	5:30	45	"	Poor.	No.	Yes.	Yes.	Good.	
16	Strippers	1			4 00	4 00	4 00	7:30	5:30	45	"	Poor.	No.	Yes.	Yes.	Good.	

17	Strippers	1	7 00	4 00	6 50	7 30	5 30	60	Large room, well lit and ventilated	Poor.	Yes.	Yes.	Good.
18	Strippers	1	3 00	1 00	3 00	7 30	5 30	60	Large room, not well ventilated	Poor.	Yes.	Yes.	Good.
19	Strippers	1	6 50	4 50	5 50	7 30	5 30	50	Large room, not well ventilated; dirty surroundings; drainage bad	No.	No.	No.	Fair.
20	Strippers	1	5 50	4 00	5 00	7 30	5 30	50	"	No.	No.	No.	Fair.
21	Strippers	1	5 00	5 00	5 00	7 30	5 30	50	"	No.	No.	No.	Good.
22	Strippers	1	7 00	5 00	6 00	7 30	5 30	50	"	No.	No.	No.	Bad.
23	Strippers	1	4 00	3 00	4 00	7 30	5 30	50	"	No.	No.	No.	Good.
24	Strippers	1	5 50	5 00	5 00	7 30	5 30	50	"	No.	No.	No.	Good.
25	Strippers	1	5 00	5 00	5 00	7 30	5 30	50	"	No.	No.	No.	Good.
1	Wrappers	1	7 00	3 00	6 00	7 30	5 30	50	Large room, well lit and ventilated	Yes.	No.	Yes.	Fair.
2	Wrappers	1	7 00	5 50	7 00	7 30	5 30	---	"	Yes.	No.	Yes.	Good.
3	Wrappers	1	8 00	5 00	8 00	7 30	5 30	45	Large room; ventilation not good	Poor.	No.	No.	Good.
4	Wrappers	1	6 00	4 00	6 00	7 30	5 30	45	"	Poor.	No.	No.	Fair.
5	Wrappers	1	7 00	5 50	6 50	7 30	5 30	45	"	Yes.	No.	Yes.	Good.
6	Wrappers	1	7 50	6 00	7 00	7 30	5 30	50	"	Yes.	No.	Yes.	Good.
7	Wrappers	1	7 50	6 00	7 00	7 30	5 30	50	"	Yes.	No.	Yes.	Good.
8	Wrappers	1	8 00	6 50	7 50	7 30	5 30	50	"	Yes.	No.	Yes.	Good.
9	Wrappers	1	6 50	5 00	6 00	7 30	5 30	50	"	Yes.	No.	Yes.	Fair.
1	Bookers	1	6 00	3 50	6 00	7 30	5 30	45	"	Poor.	No.	No.	Good.
2	Bookers	1	4 50	2 00	4 50	7 30	5 30	45	"	Poor.	No.	No.	Good.
3	Bookers	1	4 00	3 00	4 00	7 30	5 30	45	"	Poor.	No.	No.	Good.
4	Bookers	1	5 50	4 50	5 00	7 30	5 30	50	Large room; well lit and ventilated	Yes.	No.	Yes.	Fair.
5	Bookers	1	5 00	4 00	5 00	7 30	5 30	50	"	Yes.	No.	Yes.	Good.
6	Bookers	1	5 50	4 50	5 00	7 30	5 30	50	"	Yes.	No.	Yes.	Good.
7	Bookers	1	5 00	5 00	5 00	7 30	5 30	50	"	Yes.	No.	Yes.	Fair.
1	Tackers	1	5 50	5 00	5 00	7 30	5 30	50	"	Yes.	No.	Yes.	Good.
1	Tackers	1	5 50	5 00	5 00	7 30	5 30	50	"	Yes.	No.	Yes.	Good.
2	Tackers	1	9 50	5 00	9 50	7 30	5 30	50	"	Yes.	No.	Yes.	Good.
3	Tackers	1	5 00	5 00	6 00	7 30	5 30	50	"	Yes.	No.	Yes.	Fair.
4	Tackers	1	5 50	4 50	5 00	7 30	5 30	50	"	Yes.	No.	Yes.	Good.
5	Tackers	1	7 50	6 50	7 00	7 30	5 30	50	"	Yes.	No.	Yes.	Good.
6	Tackers	1	6 50	5 50	6 00	7 30	5 30	50	"	Yes.	No.	Yes.	Good.
7	Tackers	1	6 00	5 00	6 00	7 30	5 30	50	"	Yes.	No.	Yes.	Good.
1	Retouchers	1	9 00	4 00	7 50	7 30	5 30	50	"	Yes.	No.	Yes.	Good.
2	Retouchers	1	8 50	7 50	8 00	7 30	5 30	50	"	Yes.	No.	Yes.	Good.
3	Retouchers	1	8 00	7 00	7 50	7 30	5 30	50	"	Yes.	No.	Yes.	Good.
4	Retouchers	1	8 50	7 50	8 00	7 30	5 30	50	"	Yes.	No.	Yes.	Good.

NOTE.—For "personal and financial" and "home" conditions of the same person, see corresponding number in Subdivision 2, Table "B," and Subdivision 3.

TABLE A—Continued.

Number	Occupation.	Work by Time	Work by Piece	Price per Piece.	Highest Weekly Wages	Lowest Weekly Wages	Average Weekly Wages	Begin Work At	Close Work At	Lunch—Minutes	CONDITION OF WORKROOM.			State of Health.		
											Sanitary, etc.	Facilities for Washing	Facilities for changing Clothes	Separate Closets	Water	
	<i>Cigar Box Manufacture.</i>															
1	Forewoman	1	1	70 to 95¢	\$10 00	\$10 00	\$10 00	7:30	5:00	30	Large, well lit, and ventilated	Yes.	No.	Yes.	Yes.	Good.
2	Boxmaking		1	70 to 95¢	10 00	4 60	6 00	7:30	5:00	30	"	Yes.	No.	Yes.	Yes.	Good.
3	Boxmaking		1	70 to 95¢	8 50	3 45	7 00	7:30	5:00	30	"	Yes.	No.	Yes.	Yes.	Good.
4	Boxmaking		1	70 to 95¢	11 50	2 50	6 00	7:30	5:00	30	"	Yes.	No.	Yes.	Yes.	Good.
5	Boxmaking		1	70 to 95¢	9 00	2 00	5 00	7:30	5:00	30	"	Yes.	No.	Yes.	Yes.	Good.
6	Boxmaking		1	70 to 95¢	9 00	3 00	5 00	7:30	5:00	30	"	Yes.	No.	Yes.	Yes.	Good.
7	Boxmaking		1	70 to 95¢	11 00	1 50	6 00	7:30	5:00	30	"	Yes.	No.	Yes.	Yes.	Good.
8	Boxmaking		1	70 to 95¢	10 00	2 50	6 00	7:30	5:00	30	"	Yes.	No.	Yes.	Yes.	Fair.
9	Boxmaking		1	70 to 95¢	7 50	3 00	6 00	7:30	5:00	30	"	Yes.	No.	Yes.	Yes.	Good.
10	Boxmaking		1	70 to 95¢	11 00	3 50	6 00	7:30	5:00	30	"	Yes.	No.	Yes.	Yes.	Good.
11	Boxmaking		1	70 to 95¢	9 00	4 50	6 00	7:30	5:00	30	"	Yes.	No.	Yes.	Yes.	Good.
12	Boxmaking		1	70 to 95¢	8 50	3 50	5 00	7:30	5:00	30	"	Yes.	No.	Yes.	Yes.	Fair.
13	Trimming boxes		1	45 to 90¢	4 00	4 00	4 00	7:30	5:00	30	Well lit and comfortable; can sit if inclined; not crowded; no Chinese.	Yes.	No.	Yes.	Yes.	Good.
14	Trimming boxes		1	45 to 90¢	4 00	2 00	4 00	7:30	5:00	30	"	Yes.	No.	Yes.	Yes.	Good.
15	Trimming boxes		1	45 to 90¢	5 25	2 50	4 00	7:30	5:00	30	"	Yes.	No.	Yes.	Yes.	Good.
16	Trimming boxes		1	45 to 90¢	5 75	1 50	5 50	7:30	5:00	30	"	Yes.	No.	Yes.	Yes.	Good.
17	Trimming boxes		1	45 to 90¢	2 60	1 25	2 50	7:30	5:00	30	"	Yes.	No.	Yes.	Yes.	Good.
18	Trimming boxes		1	45 to 90¢	4 50	1 00	4 00	7:30	5:00	30	"	Yes.	No.	Yes.	Yes.	Good.
19	Trimming boxes		1	45 to 90¢	3 50	1 30	3 00	7:30	5:00	30	"	Yes.	No.	Yes.	Yes.	Good.
20	Trimming boxes		1	45 to 90¢	5 50	2 00	5 00	7:30	5:00	30	"	Yes.	No.	Yes.	Yes.	Good.
21	Bookkeeper		1		7 50	7 50	7 50	8:00	4:45	60	"	Yes.	No.	Yes.	Yes.	Good.
22	Bookkeeper		1		7 00	7 00	7 00	8:00	4:45	60	"	Yes.	No.	Yes.	Yes.	Good.
	<i>Cleaning and Dyeing.</i>															
1	Cleaning and dyeing	1			7 00	7 00	7 00	7:00	7:00	60	Well lit, neat, and cheerful room on ground floor.	Yes.	Yes.	No.	No.	Good.
2	Cleaning and dyeing	1			10 00	8 00	10 00	7:00	7:00	60	"	Yes.	Yes.	No.	No.	Good.
3	Cleaning and dyeing	1			8 00	8 00	8 00	7:00	7:00	60	"	Yes.	Yes.	No.	No.	Good.
4	Cleaning and dyeing	1			9 00	7 00	8 00	7:00	7:00	60	"	Yes.	Yes.	No.	No.	Fair.
5	Cleaning and dyeing	1			8 50	7 50	7 50	7:00	7:00	60	"	Yes.	Yes.	No.	No.	Good.

6	Cleaning and dyeing	1	8 65	8 65	8 65	8:00	6:00	60	Large, cheerful work-room	Yes.	No.	Good.
7	Cleaning and dyeing	1	9 00	7 00	8 00	8:00	6:00	60	"	Yes.	No.	Good.
8	Cleaning and dyeing	1	8 50	7 00	8 00	8:00	6:00	60	"	Yes.	No.	Fair.
<i>California Cotton Mills, Oakland.</i>												
1	Weaving	1	6 00	2 10	6 00	6:50	5:50	40	Large, well lit and ventilated; very clean toilet rooms; one story; machinery, belting, etc., under workroom	Yes.	Yes.	Good.
2	Weaving	1	9 00	8 10	9 00	6:50	5:50	40	"	Yes.	Yes.	Good.
3	Weaving	1	12 00	3 00	9 00	6:50	5:50	40	"	Yes.	Yes.	Good.
4	Weaving	1	9 00	4 50	8 10	6:50	5:50	40	"	Yes.	Yes.	Good.
5	Weaving	1	16 00	9 40	10 00	6:50	5:50	40	"	Yes.	Yes.	Good.
6	Weaving	1	7 50	4 50	6 60	6:50	5:50	40	"	Yes.	Yes.	Good.
7	Weaving	1	6 00	4 00	6 00	6:50	5:50	40	"	Yes.	Yes.	Good.
8	Spinning	1	6 00	6 00	6 00	6:50	5:50	40	"	Yes.	Yes.	Good.
9	Spinning	1	9 00	7 50	9 00	6:50	5:50	40	"	Yes.	Yes.	Fair.
10	Spinning	1	3 60	3 60	3 60	6:50	5:50	40	"	Yes.	Yes.	Good.
11	Spinning	1	4 50	3 60	4 50	6:50	5:50	40	"	Yes.	Yes.	Good.
12	Spooling	1	9 00	6 00	9 00	6:50	5:50	40	"	Yes.	Yes.	Good.
13	Slugging	1	6 00	8 50	9 00	6:50	5:50	40	"	Yes.	Yes.	Good.
14	Covering spindles	1	6 00	3 00	6 00	6:50	5:50	40	"	Yes.	Yes.	Good.
15	Packing	1	6 50	3 00	6 50	6:50	5:50	40	"	Yes.	Yes.	Good.
<i>Cracker Factory.</i>												
1	Packing crackers	1	12 50	6 00	7 50	6:30	5:30	60	Large, airy, clean; good light, and ventilation.	Yes.	Yes.	Good.
2	Packing crackers	1	12 50	6 00	7 50	6:30	5:30	60	"	Yes.	Yes.	Good.
3	Packing crackers	1	9 00	6 00	7 50	6:30	5:30	60	"	Yes.	Yes.	Fair.
4	Packing crackers	1	7 50	3 00	7 50	6:30	5:30	60	"	Yes.	Yes.	Good.
5	Packing crackers	1	14 10	7 50	10 50	6:30	5:30	60	"	Yes.	Yes.	Good.
6	Packing crackers	1	12 00	7 50	7 50	6:30	5:30	60	"	Yes.	Yes.	Good.
7	Packing crackers	1	7 50	3 00	7 50	6:30	5:30	60	"	Yes.	Yes.	Good.
8	Forewoman	1	18 00	10 50	12 00	6:30	5:30	60	"	Yes.	Yes.	Good.
<i>Clock and Shovel Makers.</i>												
1	Making cloaks	1	10 00	6 00	9 00	8:00	5:30	30	Workroom in basement; crowded, bad light, and ventilation	Poor.	No.	Good.
2	Making cloaks	1	12 00	8 00	10 00	8:00	5:30	30	"	Poor.	No.	Fair.
3	Making cloaks	1	9 00	5 00	8 00	8:00	5:30	30	"	Poor.	No.	Good.
4	Making cloaks	1	7 00	4 00	6 00	8:00	5:30	30	"	Poor.	No.	Fair.
5	Making cloaks	1	8 00	4 00	8 00	8:00	5:30	30	"	Poor.	No.	Good.
6	Making cloaks	1	9 00	5 00	8 00	8:00	5:30	30	"	Poor.	No.	Good.
7	Making cloaks	1	12 00	9 00	10 00	8:00	5:30	30	"	Poor.	No.	Good.
8	Making cloaks	1	7 00	3 00	6 00	8:00	6:00	40	Under sidewalk; dark, cold, bad light	Poor.	No.	Good.
9	Making cloaks	1	6 00	4 00	5 00	8:00	6:00	40	"	Poor.	No.	Fair.
10	Making cloaks	1	6 00	4 00	5 00	8:00	6:00	40	"	Poor.	No.	Good.

NOTE.—For "personal and financial" and "home" conditions of the same person, see corresponding number in Subdivision 2, Table "B," and Subdivision 3.

TABLE A.—Continued.

Number	Occupation.	Work by Time	Work by Piece	Price per Piece.	Highest Weekly Wages	Lowest Weekly Wages	Average Weekly Wages	Begin Work At	Close Work At	Lunch—Minutes	CONDITION OF WORK ROOM.				State of Health.	
											Sanitary, etc.	Facilities for Wash- ing	Facilities for chang- ing Clothes	Separate Closets		Water
1	Dressmakers.	1	—	\$3 00	\$2 00	\$3 00	8 00	6:00	60	Well ventilated; not crowded; on ground floor; good light.	Yes.	Yes.	Yes.	Yes.	Good.	
2		1	—	4 00	3 00	4 00	8:00	6:00	60	"	Yes.	Yes.	Yes.	Yes.	Good.	
3		1	—	10 00	6 00	10 00	8:00	6:00	60	"	Yes.	Yes.	Yes.	Yes.	Good.	
4		1	—	2 50	2 50	2 50	8:00	6:00	60	"	Yes.	Yes.	Yes.	Yes.	Good.	
5		1	—	10 00	2 00	6 00	8:00	6:00	60	"	Yes.	Yes.	Yes.	Yes.	Fair.	
6		1	—	7 00	4 00	7 00	8:00	6:00	60	Rooms beautifully fur- nished; clean, well lit and ventilated; small light, pleasant	Yes.	Yes.	Yes.	Yes.	Good.	
7		1	—	4 00	4 00	4 00	8:00	6:00	60	"	Yes.	Yes.	Yes.	Yes.	Good.	
8		1	—	9 00	5 00	7 50	8:00	6:00	60	"	Yes.	Yes.	Yes.	Yes.	Good.	
9		1	—	—	—	—	8:00	6:00	60	"	Yes.	Yes.	Yes.	Yes.	Good.	
10		1	—	—	—	—	8:00	6:00	60	"	Yes.	Yes.	Yes.	Yes.	Good.	
11		1	—	—	—	—	8:00	6:00	60	Comfortable; good light.	Yes.	Yes.	Yes.	Yes.	Good.	
12		1	—	—	8 00	6 00	7 00	8:00	6:00	60	"	Yes.	Yes.	Yes.	Good.	
13		1	—	—	5 00	4 00	5 00	8:00	6:00	60	Bright, well furnished; clean, on second floor.	Yes.	Yes.	Yes.	Yes.	Good.
14		1	—	—	6 00	3 00	5 00	8:00	6:00	60	"	Yes.	Yes.	Yes.	Yes.	Good.
15		1	—	—	9 00	2 00	5 50	8:00	6:00	60	"	Yes.	Yes.	Yes.	Yes.	Good.
16		1	—	—	3 00	3 00	3 00	8:00	6:00	60	Small, good light.	Yes.	Yes.	Yes.	Yes.	Fair.
17		1	—	—	3 00	3 00	3 00	8:00	6:00	60	"	—	—	—	—	—
18		1	—	—	15 00	12 00	12 00	8:00	6:00	60	Clean; well ventilated.	—	—	—	—	—
19		1	—	—	9 00	2 00	5 50	8:00	6:00	60	"	—	—	—	—	—
20		1	—	—	7 00	2 50	7 00	8:00	6:00	60	Bright, cheerful; 1st floor.	Yes.	Yes.	Yes.	Yes.	Poor.
21		1	—	—	40 00	5 00	10 00	8:00	6:00	60	Works at home.	—	—	—	—	Good.
22		1	—	—	8 00	5 00	8 00	8:00	6:00	60	Large; good light and ventilation; not crowd- ed; ground floor; in San José	Yes.	Yes.	Yes.	Yes.	Good.
23		1	—	—	8 00	3 00	6 00	8:00	6:00	60	"	Yes.	Yes.	Yes.	Yes.	Good.
24		1	—	—	6 00	4 00	5 00	8:00	6:00	60	"	Yes.	Yes.	Yes.	Yes.	Good.
25		1	—	—	7 00	3 00	6 00	8:00	6:00	60	"	Yes.	Yes.	Yes.	Yes.	Good.
26		1	—	—	6 00	4 50	5 00	8:00	6:00	60	"	Yes.	Yes.	Yes.	Yes.	Good.
27		1	—	—	—	—	—	8:00	6:00	60	"	Yes.	Yes.	Yes.	Yes.	Good.

[illegible]

NOTE.—For “personal and financial” and “home” conditions of the same person, see corresponding number in Subdivision 2, Table “B,” and Subdivision 3, Table “C.”

TABLE A—Continued.

Number	Occupation.	Work by Time	Work by Piece	Price per Piece.	Highest Weekly Wages	Lowest Weekly Wages	Average Weekly Wages	Begin Work At	Close Work At	Lunch—Minutes	CONDITION OF WORKROOM.				State of Health.	
											Sanitary, etc.	Facilities for Washing	Facilities for changing Clothes	Separate Closets		Water
41	Packing	1	1	---	\$3 00	\$1 80	\$3 00	7:00	6:00	60	Large, well lit and ventilated; comfortable room for work; seats provided; in San José. “ Workroom large and well lit; not clean; drainage bad; compelled to stand; San Francisco “ “ “ “ “ “ “ “ “	Yes.	Yes.	Yes.	Fair.	
42	Packing	1	1	---	6 50	4 00	6 00	7:00	6:00	60		Yes.	Yes.	Yes.	Good.	
43	Packing	1	1	---	6 00	4 50	6 00	7:00	6:00	60		Yes.	Yes.	Yes.	Good.	
44	Cutting	1	1	4 to 6c per box	4 50	4 50	4 50	7:00	6:00	60		Yes.	Yes.	Yes.	Good.	
45	Cutting	1	1	6c per box	7 50	6 00	7 50	7:00	6:00	60		Yes.	Yes.	Yes.	Good.	
46	Cutting	1	1	---	6 00	4 50	6 00	7:00	6:00	60		Yes.	Yes.	Yes.	Good.	
47	Packing	1	1	4c per basket	8 00	5 00	6 00	6:30	5:30	30		No.	No.	Yes.	Good.	
48	Packing	1	1	2½c per 20 cans	8 00	5 75	6 30	6:30	5:30	30		No.	No.	Yes.	Good.	
49	Packing	1	1	2½c per 20 cans	6 50	3 00	5 00	6:30	5:30	30		No.	No.	Yes.	Good.	
50	Packing	1	1	2½c per 20 cans	9 50	6 00	9 00	6:30	5:30	30		No.	No.	Yes.	Good.	
51	Packing	1	1	---	7 50	5 00	5 00	6:30	5:30	30	No.	No.	Yes.	Good.		
52	Packing	1	1	7½c per basket	7 00	3 00	5 00	6:30	5:30	30	No.	No.	Yes.	Good.		
53	Forewoman	1	1	---	15 00	15 00	15 00	6:30	5:30	30	No.	No.	Yes.	Good.		
54	Packer	1	1	2½c per 20 cans	9 00	6 00	9 00	6:30	5:30	30	No.	No.	Yes.	Good.		
55	Packer	1	1	2½c per 20 cans	5 00	5 00	5 00	6:30	5:30	30	No.	No.	Yes.	Good.		
56	Packer	1	1	4c per basket	6 00	5 00	6 00	6:30	5:30	30	No.	No.	Yes.	Good.		
57	Packer	1	1	4c per basket	5 00	5 00	5 00	6:30	5:30	30	No.	No.	Yes.	Good.		
58	Packer	1	1	---	5 00	5 00	5 00	6:30	5:30	30	No.	No.	Yes.	Good.		
<i>Fruit Basket Makers.</i>																
1	Making baskets	1	1	---	5 00	3 00	5 00	7:00	5:30	30	Long, well-lit room, on ground floor; machinery run by steam; can sit or stand	No.	No.	Yes.	Good.	
2	Making baskets	1	1	7 cents per 100	5 65	5 50	5 50	7:00	5:30	30		No.	No.	Yes.	Good.	
3	Making baskets	1	1	7 cents per 100	5 00	1 40	4 50	7:00	5:30	30		No.	No.	Yes.	Fair.	
4	Making baskets	1	1	7 cents per 100	4 95	2 15	4 50	7:00	5:30	30		No.	No.	Yes.	Good.	
5	Making baskets	1	1	7 cents per 100	6 15	1 10	5 00	7:00	5:30	30		No.	No.	Yes.	Good.	
6	Making baskets	1	1	7 cents per 100	4 00	3 50	4 00	7:00	5:30	30		No.	No.	Yes.	Good.	
7	Making baskets	1	1	7 cents per 100	5 00	3 00	5 00	7:00	5:30	30		No.	No.	Yes.	Good.	
8	Making baskets	1	1	---	5 00	4 00	5 00	7:00	5:30	30		No.	No.	Yes.	Fair.	
9	Making baskets	1	1	---	5 00	5 00	5 00	7:00	5:30	30		No.	No.	Yes.	Good.	

Gloves.													
1	Gloves	1	7 75	2 00	7 00	8 00	5 30	30	Large; good light; not crowded; on third floor; no fire escape but stairway "				

NOTE.—For “personal and financial” and “home” conditions of the same person, see corresponding number in Subdivision 2, Table “B,” and Subdivision 3, Table “C.”

TABLE A—Continued.

Number	Occupation.	Work by Time	Work by Piece	Price per Piece.	Highest Weekly Wages	Lowest Weekly Wages	Average Weekly Wages	Begin Work At	Close Work At	Lunch—Minutes	CONDITION OF WORKROOM.				State of Health.	
											Sanitary, etc.	Facilities for Washing	Facilities for changing Clothes	Separate Closets		Water
	<i>Japanawing and Tinwork.</i>															
1	Japanawing	1			\$5 00	\$5 00	\$5 00	7 00	5 30	30	Workroom very bright, clean, and nice; sit or stand	Yes.	No.	Yes.	Yes.	Good.
2	Soldering	1			5 00	5 00	5 00	7 00	5 30	30	"	Yes.	No.	Yes.	Yes.	Good.
3	Tinwork	1			4 50	4 50	4 50	7 00	5 30	30	"	Yes.	No.	Yes.	Yes.	Fair.
4	Tinwork	1			5 00	5 00	5 00	7 00	5 30	30	"	Yes.	No.	Yes.	Yes.	Good.
5	Tinwork	1		8c per 100	6 50	5 50	6 50	7 00	5 30	30	"	Yes.	No.	Yes.	Yes.	Good.
6	Tinwork	1		8c per 100	7 00	6 00	6 50	7 00	5 30	30	"	Yes.	No.	Yes.	Yes.	Good.
7	Tinwork	1		8c per 100	6 50	6 00	6 50	7 00	5 30	30	"	Yes.	No.	Yes.	Yes.	Fair.
8	<i>California Jute Mills, Oakland.</i>															
1	Carding		1	34c per piece.	9 50	5 00	6 00	6 50	5 50	30	Large but crowded; well lit and ventilated, but not clean; danger of contact with machinery; located in Oakland	Yes.	Yes.	Yes.	Yes.	Good.
2	Carding		1	34c per piece.	6 00	5 00	6 00	6 50	5 50	30	"	Yes.	Yes.	Yes.	Yes.	Good.
3	Weaving		1	75c per piece.	7 70	4 50	7 00	6 50	5 50	30	"	Yes.	Yes.	Yes.	Yes.	Good.
4	Weaving		1	75c per piece.	10 70	9 00	10 00	6 50	5 50	30	"	Yes.	Yes.	Yes.	Yes.	Good.
5	Weaving		1	75c per piece.	10 00	4 90	7 00	6 50	5 50	30	"	Yes.	Yes.	Yes.	Yes.	Good.
6	Spinning		1		6 00	5 00	6 00	6 50	5 50	30	"	Yes.	Yes.	Yes.	Yes.	Good.
7	Spinning		1		7 50	6 50	7 50	6 50	5 50	30	"	Yes.	Yes.	Yes.	Yes.	Good.
8	Spinning		1		10 00	7 50	7 50	6 50	5 50	30	"	Yes.	Yes.	Yes.	Yes.	Good.
9	Operator		1		9 80	7 80	9 80	6 50	5 50	30	"	Yes.	Yes.	Yes.	Yes.	Good.
10	Operator		1		9 80	8 00	9 80	6 50	5 50	30	"	Yes.	Yes.	Yes.	Yes.	Fair.
11	Hemming		1	3c per 100	4 20	2 40	4 20	6 50	5 50	30	"	Yes.	Yes.	Yes.	Yes.	Good.
12	Hemming		1	3c per 100	3 00	2 40	3 00	6 50	5 50	30	"	Yes.	Yes.	Yes.	Yes.	Good.
13	Piling bags		1	3c per 100	2 40	2 40	2 40	6 50	5 50	30	"	Yes.	Yes.	Yes.	Yes.	Good.
14	Piling bags		1		3 00	3 00	3 00	6 50	5 50	30	"	Yes.	Yes.	Yes.	Yes.	Good.
15	Piling bags		1		2 40	2 40	2 40	6 50	5 50	30	"	Yes.	Yes.	Yes.	Yes.	Good.
16	Doffing		1		2 40	2 40	2 40	6 50	5 50	30	"	Yes.	Yes.	Yes.	Yes.	Good.
17	Sewing bags		1	20c per 100	3 90	1 90	3 90	6 50	5 50	30	"	Yes.	Yes.	Yes.	Yes.	Good.

TABLE A—Continued.

Number	Occupation.	Work by Time	Work by Piece	Price per Piece.	Highest Weekly Wages	Lowest Weekly Wages	Average Weekly Wages	Begin Work At	Close Work At	Lunch—Minutes	CONDITION OF WORKROOM.			State of Health.	
											Sanitary, etc.	Facilities for Washing	Facilities for changing Clothes		Separate Closets	Water
	<i>Paper Box Manufacture.</i>														
1	Paper box making.	---	1	50 to \$1.50	\$10.00	\$7.00	\$8.00	7:45	6:00	60	Large, well lit; on top floor of five-story building; four stairways and two elevators for fire escape; can sit or stand	Yes.	Yes.	Yes.	Good.
2	Paper box making.	---	1	50 to \$1.50	12.00	3.50	10.00	7:45	6:00	60	"	Yes.	Yes.	Yes.	Good.
3	Paper box making.	---	1	50 to \$1.50	10.00	6.00	8.00	7:45	6:00	60	"	Yes.	Yes.	Yes.	Good.
4	Paper box making.	---	1	50 to \$1.50	10.50	5.00	8.50	7:45	6:00	60	"	Yes.	Yes.	Yes.	Good.
5	Paper box making.	---	1	50 to \$1.50	7.50	4.00	7.50	7:45	6:00	60	"	Yes.	Yes.	Yes.	Good.
6	Paper box making.	---	1	50 to \$1.50	3.50	3.00	3.50	7:45	6:00	60	"	Yes.	Yes.	Yes.	Good.
7	Paper box making.	---	1	50 to \$1.50	7.60	3.50	6.50	7:45	6:00	60	"	Yes.	Yes.	Yes.	Fair.
8	Paper box making.	---	1	50 to \$1.50	10.00	4.00	7.00	7:45	6:00	60	"	Yes.	Yes.	Yes.	Good.
9	Paper box making.	---	1	50 to \$1.50	11.30	3.50	7.45	7:45	6:00	60	"	Yes.	Yes.	Yes.	Good.
10	Paper box making.	---	1	50 to \$1.50	10.00	4.00	8.50	7:45	6:00	60	"	Yes.	Yes.	Yes.	Good.
11	Paper box making.	---	1	50 to \$1.50	8.00	7.00	7.00	7:45	6:00	60	"	Yes.	Yes.	Yes.	Good.
	<i>Printers.</i>														
1	Type setting.	1			4.00	2.50	4.00	8:00	6:00	60	Workroom large, well lit and ventilated; second floor; has fire escapes.	Yes.	Yes.	Yes.	Good.
2	Type setting.	1			4.00	2.50	4.00	8:00	6:00	60	"	Yes.	Yes.	Yes.	Good.
3	Type setting.	1			3.50	2.50	3.50	8:00	6:00	60	"	Yes.	Yes.	Yes.	Good.
4	Type setting.	1			7.50	2.50	7.50	8:00	6:00	60	"	Yes.	Yes.	Yes.	Fair.
5	Type setting.	1			6.00	2.50	6.00	8:00	6:00	60	"	Yes.	Yes.	Yes.	Good.
6	Type setting.	1			3.50	2.50	3.50	8:00	6:00	60	"	Yes.	Yes.	Yes.	Good.
7	Type setting.	1			2.50	2.50	2.50	8:00	6:00	60	"	Yes.	Yes.	Yes.	Good.
8	Type setting.	1			7.50	2.50	7.50	8:00	6:00	60	"	Yes.	Yes.	Yes.	Good.
9	Type setting.	1	1	40c 1,000 ems	9.00	1.00	9.00	8:00	6:00	60	"	Yes.	Yes.	Yes.	Good.
10	Type setting.	1	1	40c 1,000 ems	17.00	3.00	10.00	8:00	6:00	60	"	Yes.	Yes.	Yes.	Fair.
11	Canvasser	1			8.50	8.50	8.50	8:00	6:00	60	Good room but not clean; no fire escapes.	Yes.	Yes.	Yes.	Good.
12	Typesetter	---	1	25 to 30c 1,000	5.00	3.00	4.00	8:00	5:30	60	"	Poor.	No.	Yes.	Good.
13	Typesetter	---	1	25 to 30c 1,000	5.00	4.00	5.00	8:00	5:30	60	"	Poor.	No.	Yes.	Good.
14	Typesetter	---	1	25 to 30c 1,000	7.00	5.00	6.00	8:00	5:30	60	"	Poor.	No.	Yes.	Good.
15	Typesetter	---	1	25 to 30c 1,000	6.00	5.00	6.00	8:00	5:30	60	"	Poor.	No.	Yes.	Good.
16	Typesetter	---	1	25 to 30c 1,000	5.00	5.00	5.00	8:00	5:30	60	"	Poor.	No.	Yes.	Good.

17	Typesetter	1	25c 1,000 ems.	6 00	3 00	6 00	7 00	6 00	60	Large room; good light and ventilation; in San José	Yes.	Yes.	Yes.	Good.
18	Typesetter	1	25c 1,000 ems.	5 00	2 50	3 50	8 30	5 30	75	"	Yes.	Yes.	Yes.	Poor.
19	Typesetter	1	25c 1,000 ems.	9 00	3 00	7 00	8 30	5 30	75	"	Yes.	Yes.	Yes.	Good.
20	Typesetter	1	25c 1,000 ems.	7 00	6 00	7 00	8 30	5 30	75	"	Yes.	Yes.	Yes.	Good.
21	Typesetter	1	25c 1,000 ems.	9 75	2 00	6 50	8 30	5 30	75	"	Yes.	Yes.	Yes.	Good.
22	Typesetter	1		5 50	2 00	5 50	8 00	5 30	30	Fine airy room; eight girls working in it; San José	Yes.	Yes.	Yes.	Good.
23	Typesetter	1		6 00	6 00	6 00	8 00	5 30	30	"	Yes.	Yes.	Yes.	Good.
24	Typesetter	1		4 00	4 00	4 00	8 00	5 30	30	San José	Yes.	Yes.	Yes.	Good.
25	Typesetter	1		2 00	2 00	2 00	7 30	6 00	60	Large, good light and ventilation; on second floor; in San José	Yes.	No.	Yes.	Not good.
26	Typesetter	1		2 00	2 00	2 00	7 30	6 00	60	"	Yes.	No.	Yes.	Good.
27	Typesetter	1		2 00	2 00	2 00	7 30	6 00	60	"	Yes.	No.	Yes.	Good.
28	Typesetter	1		2 00	2 00	2 00	7 30	6 00	60	"	Yes.	No.	Yes.	Good.
29	Typesetter	1		4 00	4 00	4 00	7 20	7 30	6 00	"	Yes.	No.	Yes.	Good.
30	Typesetter	1		9 00	6 20	7 20	7 30	5 30	30	Large, well lit; not well ventilated	Poor.	No.	Yes.	Good.
31	Type setting	1	30 to 40c 1,000.	9 00	6 00	7 00	7 30	5 30	30	"	Poor.	No.	Yes.	Good.
32	Type setting	1	30 to 40c 1,000.							"	Poor.	No.	Yes.	Good.
33	Type setting	1	30 to 40c 1,000.							"	Poor.	No.	Yes.	Good.
34	Type setting	1	30 to 40c 1,000.	6 00	6 00	6 00	7 30	5 30	30	"	Poor.	No.	Yes.	Good.
35	Type setting	1	30 to 40c 1,000.	8 00	6 30	7 20	7 30	5 30	30	"	Poor.	No.	Yes.	Good.
36	Type setting	1		3 00	3 00	3 00	8 00	5 30	60	Small, but good light and ventilation; not crowded	Poor.	No.	No.	Good.
37	Type setting	1		4 00	4 00	4 00	8 00	5 30	45	"	Poor.	No.	No.	Good.
38	Type setting	1		1 00	1 00	1 00	8 00	5 30	45	"	Poor.	No.	No.	Good.
39	Type setting	1		6 00	1 00	6 00	8 00	5 30	45	"	Poor.	No.	No.	Good.
40	Type setting	1		6 00	1 00	6 00	8 00	5 30	45	"	Poor.	No.	No.	Good.
41	Type setting	1		1 00	1 00	1 00	8 00	5 30	45	"	Poor.	No.	No.	Good.
Saleswomen.														
1	Saleswoman	1		10 00	6 00	10 00	8 00	6 00	45	Large, well lighted and ventilated	Yes.	Yes.	Yes.	Good.
2	Saleswoman	1		8 00	8 00	8 00	8 00	6 00	30	Sunny and airy	Yes.	Yes.	Yes.	Good.
3	Saleswoman	1		6 00	6 00	6 00	8 00	6 00	60	"	Yes.	Yes.	Yes.	Good.
4	Saleswoman	1		5 85	5 85	5 85	8 00	9 00	60	Pleasant	Yes.	Yes.	Yes.	Good.
5	Saleswoman	1		8 00	8 00	8 00	8 00	6 00	30	Large, good light and ventilation	Yes.	Yes.	Yes.	Good.
6	Saleswoman	1		7 00	7 00	7 00	8 00	6 00	30	"	Yes.	Yes.	Yes.	Good.
7	Saleswoman	1		10 00	10 00	10 00	8 00	6 00	30	"	Yes.	Yes.	Yes.	Good.
8	Saleswoman	1		9 00	9 00	9 00	8 00	6 00	30	"	Yes.	Yes.	Yes.	Good.
Shirtmakers.														
1	Shirtmaker	1	\$2 40 per doz.	5 50	2 00	5 50	8 00	5 30	30	Good light, pleasant, not crowded; sewing machines run by steam; stains the only fire escape; on third floor	Yes.	Yes.	No.	Good.
2	Shirtmaker	1	2 40 per doz.	9 00	2 00	8 00	8 00	5 30	30	"	Yes.	Yes.	No.	Good.
3	Shirtmaker	1	2 40 per doz.	10 25	5 50	8 50	8 00	5 30	30	"	Yes.	Yes.	No.	Good.
4	Shirtmaker	1	1 12½ per doz.	7 50	2 50	6 50	8 00	5 30	30	"	Yes.	Yes.	No.	Good.
5	Shirtmaker	1	2 50 per doz.	6 00	4 00	5 50	8 00	5 30	30	"	Yes.	Yes.	No.	Good.

NOTE.—For "personal and financial" and "home" conditions of the same person, see corresponding number in Subdivision 2, Table "B," and Subdivision 3.

TABLE A—Continued.

Number	Occupation.	Work by Time	Work by Piece	Price per Piece.	Highest Weekly Wages	Lowest Weekly Wages	Average Weekly Wages	Begin Work At	Close Work At	Lunch—Minutes	CONDITION OF WORKROOM.				State of Health.	
											Sanitary, etc.	Facilities for Washing	Facilities for changing Clothes	Separate Closets		Water
6	Shirtmaker.	---	1	\$1 10 to 1 75 doz.	\$11 00	\$3 50	\$7 00	8:00	5:30	30	Large, well lit, top floor of 3-story building; not crowded; elevator and stairs only fire escape; machinery run by electricity.	Poor.	No.	No.	Good.	
7	Shirtmaker.	---	1	75 to 90c doz.	7 00	3 50	6 00	8:00	5:30	30	"	Poor.	No.	No.	Good.	
8	Shirtmaker.	---	1	75c to \$1 50 doz.	8 00	3 50	7 00	8:00	5:30	30	"	Poor.	No.	No.	Good.	
9	Shirtmaker.	---	1	60c to \$1 50 doz.	8 50	4 00	5 00	8:00	5:30	30	"	Poor.	No.	No.	Good.	
10	Shirtmaker.	---	1	75 to 90c doz.	7 00	3 50	6 00	8:00	5:30	30	"	Poor.	No.	No.	Good.	
11	Shirtmaker.	---	1	60c to \$1 50 doz.	8 50	4 00	6 50	8:00	5:30	30	"	Poor.	No.	No.	Good.	
12	Shirtmaker.	---	1	60c to \$1 50 doz.	7 75	2 25	4 00	8:00	5:30	30	"	Poor.	No.	No.	Good.	
13	Shirtmaker.	---	1	65c to \$1 85 doz.	9 00	2 00	8 00	8:00	5:30	30	Good room and light	Poor.	No.	No.	Fair.	
14	Shirtmaker.	---	1	60c to \$1 50 doz.	8 00	2 00	8 00	8:00	5:30	30	"	No.	No.	No.	Fair.	
15	Shirtmaker.	---	1	50c doz. pieces.	4 00	2 00	4 00	---	---	---	Works at home.	No.	No.	No.	Good.	
16	Shirtmaker.	---	1	75c doz. pieces.	6 00	4 00	5 00	---	---	---	"	---	---	---	---	
<i>Suspender Makers.</i>																
1	Making suspenders	1	---	---	9 50	5 00	7 75	8:30	5:00	60	Good sized room, good light, and ventilation.	Yes.	No.	No.	Fair.	
2	Making suspenders	1	---	---	8 00	2 00	7 00	8:30	5:00	60	"	Yes.	No.	No.	Good.	
3	Making suspenders	1	---	---	---	---	---	8:30	5:00	60	"	Yes.	No.	No.	Good.	
4	Making suspenders	1	---	---	8 00	6 00	8 00	8:30	5:00	60	"	Yes.	No.	No.	Good.	
5	Making suspenders	1	---	---	9 00	6 50	8 00	8:30	5:00	60	"	Yes.	No.	No.	Fair.	
<i>Tailoring.</i>																
1	Tailoring	---	1	---	8 00	6 00	8 00	7:00	5:30	30	Good light and ventilation; room crowded; elevator and stairs only fire escape; on fifth floor.	Poor.	No.	Yes.	Fair.	
2	Tailoring	---	1	---	7 00	6 00	7 00	7:00	5:30	30	"	Poor.	No.	Yes.	Poor.	
3	Tailoring	---	1	---	3 50	2 00	3 00	7:00	5:30	30	"	Poor.	No.	Yes.	Good.	
4	Tailoring	---	1	---	8 00	6 00	8 00	7:00	5:30	30	"	Poor.	No.	Yes.	Good.	
5	Tailoring	---	1	---	6 00	5 00	6 00	7:00	5:30	30	"	Poor.	No.	Yes.	Fair.	
6	Tailoring	---	1	---	5 00	2 50	5 00	8:00	6:00	30	"	Poor.	No.	No.	Good.	
7	Tailoring	---	1	---	4 00	3 00	4 00	8:00	6:00	30	Large, good light, not crowded; stairs for fire escape.	Poor.	No.	No.	Fair.	
8	Tailoring	---	1	---	5 00	3 50	5 00	8:00	6:00	30	"	Poor.	No.	No.	Good.	
9	Tailoring	---	1	---	6 00	4 00	5 00	8:00	6:00	30	"	Poor.	No.	No.	Good.	
10	Tailoring	---	1	---	6 00	3 00	4 00	8:00	6:00	30	"	Poor.	No.	No.	Fair.	

11	Tailoring	1	3 00	1 50	3 00	8 00	6 00	30	Well lighted; on ground floor; badly ventilated	No.	No.	No.	Fair.
12	Tailoring	1	3 00	1 50	3 00	8 00	6 00	30	"	No.	No.	No.	Good.
13	Tailoring	1	4 00	2 00	3 00	8 00	6 00	30	"	No.	No.	No.	Fair.
14	Tailoring	1	4 00	3 00	3 50	8 00	6 00	30	"	No.	No.	No.	Good.
15	Tailoring	1	9 00	7 00	8 00	8 00	6 00	45	Basement lit through glass in pavement;	Yes.	Poor.	No.	Good.
16	Tailoring	1	8 00	6 00	7 00	8 00	6 00	45	ventilation through elevator	Yes.	Poor.	No.	Fair.
17	Tailoring	1	7 00	5 00	6 00	8 00	6 00	45	"	Yes.	Poor.	No.	Good.
18	Tailoring	1	6 50	5 50	5 00	7 00	6 00	60	Small, well lighted;	Poor.	No.	No.	Good.
19	Tailoring	1	9 00	1 50	9 00	8 00	6 00	60	"	Poor.	No.	No.	Good.
20	Tailoring	1	9 00	3 00	9 00	7 00	6 00	60	first floor	Poor.	No.	No.	Good.
21	Tailoring	1	10 00	4 00	10 00	7 00	6 00	60	"	Poor.	No.	No.	Good.
<i>Trunk and Valise Makers.</i>													
1	Lining trunks	1	7 00	3 50	6 00	7 00	5 30	60	Large, well lit, clean	No.	No.	No.	Good.
2	Lining trunks	1	6 00	3 00	6 00	7 00	5 30	60	"	No.	No.	No.	Good.
3	Making valises	1	3 00	2 00	3 00	7 00	5 30	60	"	No.	No.	No.	Good.
4	Making satchels	1	7 00	2 50	7 00	7 00	5 30	60	"	No.	No.	No.	Good.
5	Making satchels	1	7 50	4 00	7 00	7 00	5 30	60	"	No.	No.	No.	Fair.
6	Making satchels	1	7 00	3 00	7 00	7 00	5 30	60	"	No.	No.	No.	Good.
<i>Upholstering.</i>													
1	Upholstering	1	9 00	6 00	9 00	8 00	6 00	60	Workroom a large base-	Poor.	No.	No.	Very good.
2	Sewing carpets	1	6 00	6 00	6 00	8 00	6 00	60	ment, light from sky-	Poor.	No.	No.	Good.
3	Sewing carpets	1	9 00	5 00	9 00	8 00	6 00	60	light in pavement;	Poor.	No.	No.	Good.
4	Sewing carpets	1	15 00	12 00	12 00	8 00	6 00	60	bad ventilation, and	Poor.	No.	No.	Good.
5	Draping	1	9 00	7 50	9 00	8 00	6 00	60	cold	Poor.	No.	No.	Good.
6	Draping	1	12 00	12 00	12 00	8 00	5 00	60	"	Poor.	No.	No.	Good.
7	Draping	1	12 00	12 00	12 00	8 00	5 00	60	Workroom large; good	Poor.	No.	No.	Good.
8	Draping	1	9 00	6 00	9 00	8 00	5 00	60	light	Poor.	No.	No.	Good.
9	Draping	1	12 00	12 00	12 00	8 00	5 00	60	"	Poor.	No.	No.	Fair.
10	Draping	1	12 00	12 00	12 00	8 00	5 00	60	"	Poor.	No.	No.	Good.
<i>Umbrella Makers.</i>													
1	Making umbrellas	1	7 50	3 50	7 50	8 00	6 00	60	Workroom well lighted	Yes.	No.	No.	Good.
2	Making umbrellas	1	8 00	4 00	8 00	8 00	6 00	60	and ventilated on	Yes.	No.	No.	Good.
3	Making umbrellas	1	8 00	3 00	7 50	8 00	6 00	60	ground floor; not	Yes.	No.	No.	Good.
4	Making umbrellas	1	8 00	5 00	5 00	8 00	6 00	60	crowded	Yes.	No.	No.	Good.
5	Making umbrellas	1	8 50	5 50	7 50	8 00	6 00	60	"	Yes.	No.	No.	Fair.
6	Making umbrellas	1	8 00	6 00	8 00	8 00	6 00	60	"	Yes.	No.	No.	Good.
7	Making umbrellas	1	7 50	4 00	7 50	8 00	6 00	60	"	Yes.	No.	No.	Good.

NOTE.—For "personal and financial" and "home" conditions of the same person, see corresponding number in Subdivision 2, Table "B," and Subdivision 3.

TABLE A—Continued.

Number	Occupation.	Work by Time	Work by Piece	Price per Piece.	Highest Weekly Wages	Lowest Weekly Wages	Average Weekly Wages	Begin Work At	Close Work At	Lunch—Minutes	CONDITION OF WORKROOM.				State of Health.	
											Sanitary, etc.	Facilities for Washing	Facilities for changing Clothes	Separate Closets		Water
Winery, San José.																
1	Labeling and pack'g	1	1	---	\$4 00	\$4 00	\$4 00	7:00	6:00	60	Large, bright, cheerful.	---	---	---	Good.	
2	Labeling and pack'g	1	1	---	4 00	4 00	4 00	7:00	6:00	60		---	---	---	Good.	
3	Labeling and pack'g	1	1	---	4 00	4 00	4 00	7:00	6:00	60		---	---	---	Good.	
4	Labeling and pack'g	1	1	---	4 00	4 00	4 00	7:00	6:00	60		---	---	---	---	
5	Type writing	1	1	---	10 00	10 00	10 00	7:00	6:00	60		---	---	---	---	
Golden Gate Woolen Mills, San Francisco.																
1	Carding	1	1	---	3 60	3 60	\$3 60	6:30	6:45	45	Large, well lighted and ventilated; Chinese work in same room, and sometimes in close proximity	Yes.	Yes.	Yes.	Good.	
2	Carding	1	1	---	3 60	3 60	3 60	6:30	6:45	45		Yes.	Yes.	Yes.	Yes.	Good.
3	Carding	1	1	---	3 90	3 90	3 90	6:30	6:45	45		Yes.	Yes.	Yes.	Yes.	Good.
4	Carding	1	1	---	4 70	4 50	4 50	6:30	6:45	45		Yes.	Yes.	Yes.	Yes.	Good.
5	Carding	1	1	---	3 60	3 60	3 60	6:30	6:45	45		Yes.	Yes.	Yes.	Yes.	Fair.
6	Carding	1	1	---	3 90	3 90	3 90	6:30	6:45	45		Yes.	Yes.	Yes.	Yes.	Good.
Woolen Mills, San José.																
1	Weaving	---	1	\$1 50 per piece.	12 00	8 00	10 00	6:30	6:15	45	Well lit and ventilated; three stories; wooden fire escapes and wooden stairways; not large enough.	Yes.	Yes.	Yes.	Good.	
2	Weaving	---	1	1 50 per piece.	11 00	8 00	10 00	6:30	6:15	45		Yes.	No.	Yes.	Yes.	Good.
3	Weaving	---	1	1 50 per piece.	12 00	8 00	10 00	6:30	6:15	45		Yes.	No.	Yes.	Yes.	Good.
4	Weaving	---	1	1 50 per piece.	10 00	10 00	10 00	6:30	6:15	45		Yes.	No.	Yes.	Yes.	Good.
5	Weaving	---	1	1 50 per piece.	10 00	10 00	10 00	6:30	6:15	45		Yes.	No.	Yes.	Yes.	Good.
6	Burling	1	1	---	6 00	6 00	6 00	6:30	6:15	45		Yes.	No.	Yes.	Yes.	Bad.
7	Burling	1	1	---	6 00	6 00	6 00	6:30	6:15	45		Yes.	No.	Yes.	Yes.	Bad.
8	Burling	1	1	---	6 00	6 00	6 00	6:30	6:15	45		Yes.	No.	Yes.	Yes.	Good.
9	Burling	1	1	---	6 00	6 00	6 00	6:30	6:15	45		Yes.	No.	Yes.	Yes.	Good.
10	Spooling	1	1	---	4 50	4 50	4 50	6:30	6:15	45		Yes.	No.	Yes.	Yes.	Good.
11	Spooling	1	1	---	4 80	4 80	4 80	6:30	6:15	45		Yes.	No.	Yes.	Yes.	Poor.
12	Spooling	1	1	---	4 50	4 50	4 50	6:30	6:15	45		Yes.	No.	Yes.	Yes.	Good.
13	Spooling	1	1	---	4 50	4 50	4 50	6:30	6:15	45		Yes.	No.	Yes.	Yes.	Good.

14	Spooling	1	4 50	4 50	6 30	6 15	45	Yes.	No.	Yes.	Good.
15	Spooling	1	4 50	4 50	6 30	6 15	45	Yes.	No.	Yes.	Good.
16	Drawing frame	1	6 00	6 00	6 30	6 15	45	Yes.	No.	Yes.	Good.
17	Finisher	1	6 00	6 00	6 30	3 15	45	Yes.	No.	Yes.	Good.

NOTE.—For "personal and financial" and "home" conditions of the same person, see corresponding number in Subdivision 2, Table "B," and Subdivision 3.

CHAPTER II—SUBDIVISION 2.

TABLE B.
TABLE SHOWING PERSONAL AND FINANCIAL CONDITIONS OF WORKINGWOMEN.

Number	Birthplace.	Present Age	Age When Began to Work.	Single	Married	Widow	LIVE AT.				WEEKLY.		FINANCIAL RESULTS OF PAST YEAR.				Birthplace of Father.	Birthplace of Mother.	
							Home	Boarding House	Lodging House	Private Family	Room Rent	Board	Expense for Room and Board	Clothing Expense.	Total Actual Ex- pense	Savings			
1	<i>Bookbinding.</i> California	25	14	1			1					\$260 00	\$135 00	\$600 00	0	Germany	Germany.		
2		Louisiana	27	12	1			1					260 00		421 00	0	Ireland	Ireland.	
3		Louisiana	24	12					1	\$1 00	\$3 00				440 00		Ireland	Ireland.	
4		California	22	14	1			1										Ireland	Ireland.
5		California	20	17	1			1		1 00	3 00		280 00	120 00	364 00	0	Ireland	Ireland.	
6		Dist. of Columbia.	20	18	1			1										Ireland	Ireland.
7		New York	19	13	1			1										Ireland	Ireland.
8		Australia.	28	17	1			1		1 00	3 00		360 00	128 00	504 00	0	Germany	England.	
9		California	21	16	1			1					210 00	130 00	480 00	0	England	New York.	
10		California	22	17	1			1		1 00	3 00		208 00	120 00	450 00	0	Ireland	Ireland.	
11		California	20	16	1			1										Rhode Island	Ireland.
12		England	19	15	1			1					308 00	468 00		0	England	Ireland.	
13		Dist. of Columbia	17	15	1			1										Ireland	Ireland.
14		Germany	19	16	1			1					156 00	169 00	364 00	0	California	New Jersey.	
15		Nevada.	18	16	1			1								0	Ireland	Ireland.	
16		California	16	15	1			1										Ireland	Ireland.
17		California	17	16	1			1										England	Ireland.
	<i>Boot and Shoemakers,</i>																		
	<i>San Francisco.</i>																		
1	California	28	16		1		1					260 00		504 00		Ireland	Scotland.		
2	California	17	16	1			1									Ireland	Ireland.		
3	New York	19	17	1			1									Sweden	Ireland.		
4	San Francisco	19	15	1			1								0	Ireland	Massachusetts.		
5	California	23	17	1			1					208 00				Germany	Germany.		
6	Massachusetts.	24	15	1			1		4 00					575 00	0	Ireland	Ireland.		

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NOTE.—For “working” and “home” conditions of the same person, see corresponding number in Subdivision 1, Table “A,” and Subdivision 3.

TABLE B.—Continued.

Number	Birthplace.	Present Age	Age When Began to Work.	Single	Married	Widow	LIVE AT.				WEEKLY.		FINANCIAL RESULTS OF PAST YEAR.				Birthplace of Father.	Birthplace of Mother.
							Home	Boarding House	Lodging House	Private Family	Room Rent.	Board	Expense for Room and Board.	Clothing Expense.	Total Actual Ex- pense	Savings		
Candy-makers.																		
1	California	17	14	1			1										Louisiana.	
2	California	20	17	1			1										England	
3	California	19	15	1			1							\$400 00	0		Ireland	
4	California	18	16	1			1							360 00	0		Ireland	
5	New York	19	14	1			1										New York	
6	Ireland	18	16	1			1										Ireland	
7	Massachusetts	17	15	1			1										Ireland	
Chocolate Factory.																		
1	California	23	14	1			1										Ireland	
2	Italy	24	11		1												Italy	
3	California	21	16	1													Ireland	
Cigarmakers, San Francisco.																		
1	California	14	13	1			1										Spain	
2	California	24	9			1	1							\$100 00	260 00	0	California	
3	San Francisco	17	16	1			1							115 00	260 00	0	Ireland	
4	California	19	14	1			1										Ireland	
5	California	20	15	1			1							\$156 00	169 00	240 00	Germany	
6	California	19	16	1			1							138 00	240 00	0	Ireland	
7	California	17	15	1			1							156 00	100 00	286 00	Massachusetts.	
8	California	25	12	1			1							208 00	108 00	364 00	New York	
9	New York	19	16	1			1								156 00	286 00	Ireland	
10	San Francisco	15	14	1			1										Ireland	
11	San Francisco	18	15	1			1							130 00	110 00	260 00	Ireland	
12	San Francisco	16	14	1			1										Ireland	
13	California	18	14	1			1										Ireland	
14	San Francisco	14	13	1			1										Ireland	
15	Ireland	49	20		1		1							160 00	100 00	250 00	Ireland	

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NOTE.—For “working” and “home” conditions of the same person, see corresponding number in Subdivision 1, Table “A,” and Subdivision 3.

TABLE B—Continued.

Number	Birthplace.	Present Age	Age When Began to Work	Single	Married	Widow	LIVE AT.				WEEKLY.		FINANCIAL RESULTS OF PAST YEAR.				Birthplace of Father.	Birthplace of Mother.
							Home	Boarding House	Lodging House	Private Family	Room Rent	Board	Expense for Room and Board	Clothing Expense.	Total Actual Ex- pense	Savings		
	<i>Cigar Box Makers.</i>																	
1	Ireland	35	11	1			1									Ireland	Ireland	
2	San Francisco	23	17	1			1									Ireland	Ireland	
3	California	19	16	1			1									Ireland	Ireland	
4	California	21	15	1			1									Ireland	Ireland	
5	California	22	14	1			1									Germany	Germany	
6	Michigan	20	15	1			1									Canada	Canada	
7	California	24	14	1			1									Scotland	England	
8	California	21	16	1			1									Europe	Europe	
9	Italy	20	14	1			1									Italy	Italy	
10	Mississippi	36				1										Germany	Germany	
11	California	19	15	1			1									Ireland	Ireland	
12	California	11	11				1									Italy	Italy	
13	Italy	20	16	1			1									Italy	Italy	
14	New York	20	16	1			1									Scotland	France	
15	California	17	14	1			1									Dist. of Columbia	Ireland	
16	California	20	17	1			1									Ireland	France	
17	New York	19	16	1			1									England	England	
18	Scotland	17	16	1			1									England	England	
19	California	15	14	1			1									Scotland	Nebraska	
20	California	14	13	1			1									Ireland	England	
21	California	18	16	1			1									Germany	Germany	
22	Iowa	25	18	1			1									Germany	England	
	California	19	16	1			1									Pennsylvania	Pennsylvania	
	<i>Cleaning and Dyeing.</i>															Maine	Louisiana	
1	Scotland	18	16	1			1									Scotland	Scotland	
2	Ireland	28	22	1				1	\$1 50	\$4 00						Ireland	Ireland	
3	Ireland	24	21	1			1									Ireland	Ireland	
4	England	24	16	1			1									England	England	
5	New York	18	15	1			1									Ireland	New York	
6	Pennsylvania	34	15	1			1									England	England	

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Note.—For “working” and “home” conditions of the same person, see corresponding number in Subdivision 1, Table “A,” and Subdivision 3, Table “B.”

TABLE B—Continued.

Number	Birthplace.	Present Age	Age When Began to Work	Single	Married	Widow	LIVE AT.				WEEKLY.		FINANCIAL RESULTS OF PAST YEAR.				Birthplace of Father.	Birthplace of Mother.
							Home	Boarding House	Lodging House	Private Family	Room Rent	Board	Expense for Room and Board	Clothing Expense	Total Actual Expense	Savings		
1	Dressmakers.	17	16	1			1										England	England.
2	California	18	15	1			1										Ireland	Ireland.
3	California	19	16	1			1										New York	New York.
4	Massachusetts	54	17	1		1	1								\$720 00	0	New York	New York.
5	Scotland	18	17	1			1										Scotland	Scotland.
6	California	20	15	1			1								264 00	0	Ireland	Ireland.
7	New York	20	15	1						1	\$3 50		\$182 00	\$169 00	364 00	0	Ireland	Ireland.
8	California	17	16	1			1										Ireland	Ireland.
9	California	21	21	1			1										Ireland	Ireland.
10	California	19	16	1			1										Ireland	Ireland.
11	California	16	16	1			1										New York	New York.
12	California	21	18	1			1										New York	New York.
13	Ireland	18	17	1					1		3 50		172 00		364 00		Ireland	New Brunswick.
14	California	15	13	1			1										Ireland	Ireland.
15	California	14	13	1			1										Germany	Germany.
16	California	17	15	1			1										Ireland	Ireland.
17	California	24	20	1			1			1						0	Massachusetts	Massachusetts.
18	California	16	16	1			1										Ireland	Ireland.
19	California	29	15	1			1										Massachusetts	Massachusetts.
20	Virginia	54	52	1		1				1							Ireland	Ireland.
21	California	21	18	1			1						168 00	68 00	270 00	\$50 00	Virginia	Virginia.
22	New York	44	30	1			1										Ireland	Ireland.
23	California	26	16	1		1				1							New York	New York.
24	California	21	16	1			1								356 00	60 00	Massachusetts	Massachusetts.
25	California	25	24	1			1										Scotland	Canada.
26	California	22	18	1			1				4 00		208 00	96 00	312 00		Tennessee	Ohio.
27	California	19	16	1			1										Ireland	Ireland.
																	New York	New York.

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NOTE.—For "working" and "home" conditions of the same person, see corresponding number in Subdivision 1, Table "A," and Subdivision 3.

TABLE B—Continued.

Number	Birthplace.	Present Age	Age When Began to Work	Single	Married	Widow	LIVE AT.				WEEKLY.		FINANCIAL RESULTS OF PAST YEAR.				Birthplace of Father.	Birthplace of Mother.
							Home	Boarding House	Lodging House	Private Family	Room Rent	Board	Expense for Room and Board	Clothing Expense	Total Actual Expense	Savings		
41	Ireland	52	39			1	1								\$206 00		Ireland	Ireland.
42	Ohio	49	16		1		1										Ohio	Ohio.
43	California	23	9		1		1									\$50 00	Chili	Chili.
44	California	14	14	1			1										Indiana	Indiana.
45	Massachusetts	21	12	1			1										Massachusetts	Massachusetts.
46	California	16	14	1					1				\$216 06			0	Georgia	Illinois.
47	Italy	27	20		1												Italy	Italy.
48		50	40			1	1										Pennsylvania	Virginia.
49	Virginia	64	56		1		1							\$38 00	300 00	0	Ireland	Ireland.
50	New York	45	16		1		1							60 00	100 00	0	Ireland	Ireland.
51	San Francisco	17	12	1			1							30 00	172 00	0	Virginia	Virginia.
52	Virginia	52	17			1			1		\$1 00						Ireland	Ireland.
53	New York	39	14		1									36 00	320 00	0	Italy	Italy.
54	Italy	28	15		1		1								160 00	0	Italy	Italy.
55	Italy	27	16		1		1				1 00				208 00		Italy	Italy.
56	Italy	34	15		1						1 00		142 00	30 00	342 00		Virginia	Virginia.
57	Virginia					1	1							60 00				
58	California			1			1											
<i>Fruit Basket Makers.</i>																		
1	California	18	18				1										Scotland	Ireland.
2	Kansas	15	13		1		1										Germany	Germany.
3	Europe	15	14		1		1										Europe	Europe.
4	California	15	14						1								New York	California.
5	California	15	13		1												Delaware	England.
6	California	16	15		1												Michigan	Ireland.
7	Missouri	17					1										Scotland	Scotland.
8	California	18	15		1		1										Germany	Germany.
9	New York	19	16				1										New York	New York.

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NOTE.—For "working" and "home" conditions of the same person, see corresponding number in Subdivision 1, Table "A," and Subdivision 3.

TABLE B—Continued.

Number	Birthplace.	Present Age	Age When Began to Work	Single	Married	Widow	LIVE AT.				WEEKLY.		FINANCIAL RESULTS OF PAST YEAR.				Birthplace of Father.	Birthplace of Mother.
							Home	Boarding House	Lodging House	Private Family	Room Rent	Board	Expense for Room and Board	Clothing Expense	Total Actual Expense	Savings		
1	<i>Japanning and Tinwork.</i>	21	17	1			1						\$156 00	\$134 00	\$234 00	0	Massachusetts	..... Ireland.
2	New York	17	15	1										100 00	260 00	0	Germany	..... Germany.
3	California	19	15	1			1						208 00	52 00	260 00		New York	..... New York.
4	California	18	14	1					1			\$3 00	182 00	42 00	234 00	0	Ireland	..... Ireland.
5	California	17	16	1			1										Ireland	..... Ireland.
6	California	23	19	1									169 00		338 00	0	New York	..... New York.
7	California	18	15	1	1		1										New York	..... New York.
8	Massachusetts	19	16	1													Ireland	..... Massachusetts.
	<i>California, Jute Mills, Oakland.</i>																New York	..... England.
1	Azores	19	14	1			1										Azores	..... Azores.
2	California	22	12	1													New York	..... New York.
3	Scotland	24	13	1			1										Ireland	..... Scotland.
4	Scotland	27	13	1	1										280 00	\$240 00	Scotland	..... Scotland.
5	Massachusetts	17	14	1			1										Ireland	..... Ireland.
6	Germany	18	14	1			1										Germany	..... Germany.
7	England	25	7	1			1										Scotland	..... Ireland.
8	Scotland	29	15	1	1		1							\$165 00	330 00	180 00	Ireland	..... Ireland.
9	California	21	15	1			1								410 00	100 00	England	..... England.
10	California	19	14	1													Germany	..... Germany.
11	Ireland	16	13	1			1										Ireland	..... Ireland.
12	West Indies	14	13	1			1										United States	..... West Indies.
13	.....	15	15	1			1											
14	California	16	15	1			1										Ireland	..... Ireland.
15	California	11	11	1			1										Pennsylvania	..... South Carolina.
16	California	12	11	1			1										Germany	..... Germany.
17	Missouri	19	18	1			1										Ireland	..... Ireland.

TABLE B—Continued.

Number	Birthplace.	Present Age.	Age When Began to Work.	Single.	Married.	Widow.	LIVE AT.				WEEKLY.		FINANCIAL RESULTS OF PAST YEAR.				Birthplace of Father.	Birthplace of Mother.
							Home.	Boarding House.	Lodging House.	Private Family.	Room Rent.	Board.	Expense for Room and Board.	Clothing Expense.	Total Actual Ex- pense.	Savings.		
7	California	16	14	1	1		1									Ireland	Ireland.	
8	New York	19	16	1	1		1							\$364 00	0	France	New York.	
9	California	18	15	1	1		1									Ireland	Connecticut.	
10	California	16	14	1	1		1									England	New Jersey.	
11	Massachusetts.	19	14	1	1		1									Germany	Ireland.	
<i>Printers.</i>																		
1	California	16	15	1	1		1									Massachusetts	Virginia.	
2	California	16	15	1	1		1									Massachusetts	Virginia.	
3	California	18	17	1	1		1									New York	New York.	
4	California	17	15	1	1		1									Ireland	Ireland.	
5	California	16	14	1	1		1									Ireland	Ireland.	
6	California	17	16	1	1		1									England	England.	
7	California	18	16	1	1		1									New York	New York.	
8	California	18	17	1	1		1									Ireland	Ireland.	
9	England.	20	18	1	1		1									Scotland	Scotland.	
10	Nevada.	20	16	1	1		1	\$1 00	\$4 00	\$260 00	\$135 00	445 00	\$75 00			Ireland	Ireland.	
11	California	17	17	1	1		1									California	California.	
12	California	16	15	1	1		1									Massachusetts	Ireland.	
13	California	15		1	1		1									Ireland	Ireland.	
14	California	18	16	1	1		1	3 00	156 00				0			Ireland	Ireland.	
15	California	18	16	1	1		1									Massachusetts	Massachusetts.	
16	California	16	15	1	1		1									Ireland	Ireland.	
17	Missouri	21	20	1	1		1									New York	Iowa.	
18	California	18	17	1	1		1									Ireland	Ireland.	
19	Indiana	24	20	1	1		1									Indiana	Indiana.	
20	California	23	19	1	1		1									Illinois	Illinois.	
21	California	23	19	1	1		1									New York	Massachusetts.	
22	California	20 ¹	20	1	1		1									Ohio	New York.	
23	California	20	19	1	1		1	1 25	3 00	300 00	91 00	312 00	0			Iowa.	Iowa.	

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NOTE.—For “working” and “home” conditions of the same person, see corresponding number in Subdivision 1, Table “A,” and Subdivision 3.

TABLE B—Continued.

Number	Birthplace.	Present Age	Age When Began to Work	Single	Married	Widow	LIVE AT.				WEEKLY.		FINANCIAL RESULTS OF PAST YEAR.				Birthplace of Father.	Birthplace of Mother.
							Home	Boarding House	Lodging House	Private Family	Room Rent	Board	Expense for Room and Board	Clothing Expense.	Total Actual Expense	Savings		
14	Connecticut	39	18		1		1										New York	Connecticut.
15	Connecticut	20	16	1			1										Canada	Connecticut.
16	Ireland	38	17		1		1										Ireland	Ireland.
17	Ireland	24	16				1										Ireland	Ireland.
	<i>Suspender Makers.</i>																	
1	Ireland	35	28			1	1						\$30 00	\$226 00	\$338 00		Canada	Illinois.
2	New York	21	19	1			1						208 00		304 00		England	England.
3	California																New Hampshire	Ireland.
4	California	19	16	1													New York	New York.
5	Ireland	22	15														Ireland	Ireland.
	<i>Tailoring.</i>																	
1	California	22	16	1			1						119 00	208 00	416 00	0	England	Ireland.
2	Massachusetts	23	13		1		1						208 00	65 00	364 00	0	Ireland	Ireland.
3	California	15	14	1			1										Ireland	Ireland.
4	California	20	12	1			1						194 00	212 00	416 00	0	Ireland	Ireland.
5	California	19	15	1			1										Pennsylvania	Pennsylvania.
6	California	19	17	1			1										Ireland	Ireland.
7	California	17	15	1			1										Ireland	England.
8	Ireland	21	16	1			1										Ireland	Ireland.
9	California	18	15	1			1										New York	New York.
10	California	17	15	1			1										Ireland	Ireland.
11	Nevada	16	14	1				1				\$1 25	55 00	87 00	158 00	0	New York	Ireland.
12	New York	18	17	1					1		\$1 50	3 00					New York	New York.
13	California	17	15	1								3 00				0	Ireland	Ireland.
14	Massachusetts	17	16	1				1									New York	Massachusetts.
15	California	24	18	1			1										Ireland	Ireland.
16	California	19	16	1			1										Ireland	Ireland.
17	New York	18	14	1			1										New York	Massachusetts.
18	California	17	16	1			1										Ireland	New York.

19	California	18	15	1	1	1	1	1	156 00	234 00	404 00	0	England	England.
20	France	23	14	1	1	1	1	1	235 00	520 00			France	France.
21	New York	19	17	1	1	1	1	1					Ireland	Ireland.
<i>Trunk and Valise Makers.</i>														
1	California	19	17	1	1	1	1	1					Ireland	Ireland.
2	Oregon	18	15	1	1	1	1	1					Germany	Ireland.
3	California	16	14	1	1	1	1	1				0	Germany	New York.
4	California	20	12	1	1	1	1	1	104 00				Germany	Germany.
5	Ireland	18	16	1	1	1	1	1					Ireland	Ireland.
6	California	19	15	1	1	1	1	1					England	England.
<i>Upholstering.</i>														
1	California	25	16	1	1	1	1	1		200 00	508 00		Louisiana	Scotland.
2	New York	20	19	1	1	1	1	1					New York	New York.
3	New York	37	16	1	1	1	1	1					New York	New York.
4	California	19	15	1	1	1	1	1					England	Ireland.
5	Ireland	40	14	1	1	1	1	1				0	England	Ireland.
6	New Jersey	22	15	1	1	1	1	1			459 00		New Jersey	New York.
7	California	18	16	1	1	1	1	1		278 00			England	England.
8	California	19	15	1	1	1	1	1					Ireland	Ireland.
9	Massachusetts	19	15	1	1	1	1	1					Massachusetts	Massachusetts.
10	California	18	14	1	1	1	1	1					England	Ireland.
<i>Umbrella Makers.</i>														
1	California	20	15	1	1	1	1	1					Ireland	Ireland.
2	California	18	16	1	1	1	1	1					Ireland	Ireland.
3	California	18	11	1	1	1	1	1					England	England.
4	Pennsylvania	57	20	1	1	1	1	1					England	Pennsylvania.
5	California	27	15	1	1	1	1	1					Ireland	Ireland.
6	New York	19	16	1	1	1	1	1					Ireland	New York.
7	California	21	17	1	1	1	1	1					England	England.
<i>Winery, San José.</i>														
1	California	17	17	1	1	1	1	1					Vermont	New York.
2	California	19	17	1	1	1	1	1	241 00				New York	New York.
3	Iowa	16	16	1	1	1	1	1	3 00				England	England.
4	California	17	17	1	1	1	1	1					Massachusetts	Massachusetts.
5	California	16	16	1	1	1	1	1					England	England.

NOTE.—For "working" and "home" conditions of the same person, see corresponding number in Subdivision 1, Table "A," and Subdivision 3.

TABLE B—Continued.

Number	Birthplace.	Present Age	Age When Began to Work	Single	Married	Widow	LIVE AT.				WEEKLY.		FINANCIAL RESULTS OF PAST YEAR.				Birthplace of Father.	Birthplace of Mother.
							Home	Boarding House	Lodging House	Private Family	Room Rent	Board	Expense for Room and Board	Clothing Expense	Total Actual Expense	Savings		
	<i>Golden Gate Woolen Mills, San Francisco.</i>																	
1	California	21		1			1										France	Canada
2	California	16	15	1			1										New York	Ireland
3	California	15	13	1			1										New York	New York
4	California	16		1			1										New York	Germany
5	New York	18	15	1			1										Ireland	Ireland
6	California	19	16	1			1										New York	New York
	<i>Woolen Mills, San José.</i>																	
1	California	18	16	1			1						\$300 00		\$750 00		Ohio	Ohio
2	California	18	17	1			1								400 00		United States	United States
3	California	19	18	1			1								400 00		England	England
4	Rhode Island	17	15	1			1								400 00		England	England
5	England	41	20		1		1									\$50 00	England	England
6	England	35	12		1		1										England	England
7	Missouri	18	16	1			1										Missouri	Missouri
8	California	20	18	1			1						\$156 00				Michigan	Missouri
9	California	17	15	1			1							156 00	312 00		Ohio	Ohio
10	California	15	15	1			1										New York	Ireland
11	New York	41	15			1					\$1 00	\$3 00	208 00				England	England
12	Scotland	18	14	1			1										Scotland	Scotland
13	California	18	16	1			1										Michigan	Missouri
14	Alaska	18	18	1			1										Alaska	Alaska
15	Michigan	17	15	1			1										England	England
16	California	17	16	1			1								250 00		New York	New York
17	California	17	15	1			1										Michigan	Missouri

NOTE.—For "working" and "home" conditions of the same person, see corresponding number in Subdivision 1, Table "A," and Subdivision 3.

CHAPTER II—SUBDIVISION 3.

HOME CONDITIONS OF WORKINGWOMEN.

NOTE.—For "Working" and "Personal and Financial" conditions of the same person, see corresponding number in Subdivisions 1 and 2, Tables "A" and "B."

BOOKBINDING—HOME CONDITIONS.

No. 1. Lives with mother; helps to support her; dresses very well; good public school education.

No. 4. Lives with parents; educated at a convent; saves nothing; dresses well.

No. 5. Well dressed; been through grammar school; lives with parents; works for pin money.

No. 6. Lives with parents and gives all wages to mother, who provides for all her wants; knows nothing of expenses; been through grammar school.

No. 7. Lives with mother and gives all wages to her; she provides; dresses very well; good common school education.

No. 8. Rents a small flat furnished with her own furniture; mother dead; well educated; well dressed.

No. 11. Lives with parents who are well off; owns home and vineyard in Fresno; well dressed; well educated.

No. 12. Father dead; mother married again; lives with mother; been to public school.

No. 13. Lives at home with mother; father a miner; does not live at home, but contributes towards support of family; gives wages to mother, who provides; neatly dressed; been to public school.

No. 14. Father owns ranch in country; been through grammar school; well dressed.

No. 15. Lives with mother, who is a widow and has some means of support; been to public school; neatly dressed.

No. 16. Lives in Oakland with mother, who is a widow; home belongs to mother; she and brother support mother; been to public school; well dressed; gives wages to mother, who provides for all.

BOOT AND SHOEMAKERS, SAN FRANCISCO—HOME CONDITIONS.

No. 1. Husband seems to give no support; lives with parents, in healthy locality; good two-story house, with six rooms; surroundings pleasant; mother takes care of her when sick; cannot state exact amount spent for clothing; all rest of earnings go for clothes, pleasures, etc., after board is paid; well educated and well dressed; saves nothing.

No. 2. Gives all wages to parents, who live in a healthy locality; surroundings pleasant; house well furnished; will marry and quit work next month; mother will give her a nice wedding and wedding clothes; good grammar school education; well dressed.

No. 3. Lives with parents; gives all wages to mother; has pleasant, cheerful home; receives company; is a lady in parlor, evenings; dresses very well; good common school education; healthy, quiet surroundings; mother uses wages as she thinks best.

No. 4. Has kind parents; gives most of her wages to them; father works; have three small children dependent on them; live in comfortable house of five rooms; well educated; well dressed and well fed; spends all she does not give to parents on clothing, pleasure, street car, etc.; saves nothing.

No. 5. Father shoemaker; live in upper flat of six rooms; two brothers at work; pays board to parents; knows little of her expenses after board; good, kind parents; well dressed and well educated; spends all for clothing and pleasure after board and lodging are paid; nothing saved.

No. 6. Mother and daughter live together; father dead some years; daughter bears all the expenses while mother keeps house; rents one room to help; has little children cousins she helps to support; well dressed; public school education.

No. 7. Lives with sister in house of five rooms; sister married; parents in Ireland; neatly dressed; ordinary education; quiet, healthy location; house neatly furnished.

No. 9. Mother a widow; owns her home; has two sons and another daughter who are contributing toward support of family; all live with mother in a nice, quiet, healthy home, well furnished; all live well and dress well; a good education; mother keeps house, does her own washing.

No. 10. Lives with parents; father quite old and not able to work, but has saved something from his earnings; has several sons who help to support father and mother; a good, happy family; all live together and do their part; a well dressed girl; been through grammar school.

No. 11. Lives with parents; father works, makes a good living; gives wages to mother; she supplies her clothes and other wants; knows nothing of expenses; been through grammar school; lives in nice, quiet home.

No. 12. Lives with parents; father works; provides well for family; gives wages to mother, who clothes her well and gives her pleasure money; been through grammar school; home quiet; healthy surroundings.

No. 13. Lives with mother, who is a widow; has sons who help to support her; spends all wages.

No. 14. Father lives, and owns home in country; mother dead; prefers to live in city and work in factory; been through grammar school; neatly dressed; boarding house is home-like.

No. 15. Widow; worked before marriage; gave it up for several years after marriage, but resumed it again after husband's death; had means of support until recently; had to make ends meet; won't go in debt; saves nothing; takes some meals in restaurant, some cooked in her room; rents unfurnished rooms and furnishes them herself; educated in Massachusetts; good plain clothing; could give no correct account of expenses; all is spent; more if she had it.

No. 16. Parents dead; only two sisters; both work in same factory; both room together in a quiet, homelike place; been to public school; plainly dressed.

No. 17. Father in good circumstances; has property, and sold his home; going to build new home; gives wages to mother; knows nothing of expenses.

No. 18. Wages to mother; divorced widow.

No. 20. Parents own home; father works and makes a good living; one son works; gives wages to mother.

No. 21. Mother is a widow; two brothers help to support family; home belongs to mother; all make comfortable living and enjoy it; well dressed; been through grammar school.

No. 22. Lives with parents; wages to mother; father well off; well dressed; healthy, quiet home.

No. 23. Mother a widow; she and three brothers support family; mother not strong, and one sister helps her at home; one small one goes to school; all make comfortable living; half wages to mother; rest for clothes and necessities; home belongs to mother; been to public school; well dressed; home surroundings very pleasant.

No. 24. Lives with parents; gives wages to mother; been to public school.

No. 25. Mother a widow; she and one brother live with mother and help to support her; mother keeps home and takes in sewing; they make a comfortable living; mother uses the wages as she thinks best; girl knows nothing of expenses; neatly dressed; been through grammar school; home surroundings pleasant.

No. 27. Lives with parents; father disabled for work by an accident, but has saved enough for comfort; the daughter, the only child, is self supporting; plainly dressed; public school education; pleasant home.

No. 32. Lives with parents in a nice house of six rooms; seven in family; father works.

No. 33. Mother and father dead; lives with sister; well dressed; good grammar school education; a sensible girl; saves something every year; home pleasant; healthy location.

No. 35. Father dead; mother owns home and other property, rents for support of family; several children dependent; good house, with sufficient rooms for health and comfort, well lighted and well furnished; good education; well dressed.

No. 39. Father dead; lives with mother, who works in the same factory; one sister keeps house; another works; all put wages together; mother does the spending; a good mother, who looks after the welfare of the children; knows nothing of expenses; has a quiet home; well dressed; plain education.

No. 40. Can give no exact account of expenses; lives with parents and pays no board; dresses fine; spends all on clothing and pleasure; home pleasant; father gas collector.

No. 41. Gives all wages to mother, who spends as she thinks best; lives in healthy, comfortable house of five rooms; father, longshoreman; well educated and well dressed; well kept generally; saves nothing.

No. 42. Lives with parents, in comfortable house with five rooms; wages are given to parents, who have five other children; some work, but others are too small; surroundings good and healthy; good education; well dressed; mother furnishes all clothing and pleasure money.

No. 44. Mother keeps boarding house on one of the best streets; gives wages to mother; dresses nicely; well educated.

No. 45. Lives with mother, who is a widow, in a nice two-story house; sister and brother work, and support mother and five small children; mother in poor health, and keeps house; nothing is saved; good, plain education; plainly dressed.

No. 47. Gives wages to mother, who provides; pays no board; mother uses the money as she thinks best, and dresses her very nicely; good grammar school education; lives in healthy home.

No. 48. Father dead, and lives with mother, and also gives wages to her, who looks after her wants; knows nothing of expenses; well dressed; well educated; home in nice, quiet location.

No. 49. Found two girls about eighteen or nineteen years old, working in a large Chinese shoe factory with one hundred or more Chinese workmen, and they were the only white persons in the establishment; one girl gave me this much information: Both preferred to work there, with and under Chinamen, because they got higher wages; one said, father was dead and lived with mother and sister at home; the other, mother dead and lived with father.

CANDYMAKERS—HOME CONDITIONS.

No. 1. Lives with parents in good house; gives wages to mother, who spends as she thinks best; public school education.

No. 2. Lives with parents; gives wages to mother, who provides for all her necessities; dresses well; public school education.

No. 3. Lives with mother, who is a widow with four children; poorly dressed; fair education.

No. 4. Lives with parents; father drinks, and brings little earnings home; poorly dressed; fair education.

No. 5. Lives with father, who is a shoemaker, but earns little at his trade; good education.

CHOCOLATE FACTORY—HOME CONDITIONS.

No. 1. Lives with mother; father died recently; gives wages to mother; she uses as she thinks best; neatly dressed; been to public school.

No. 2. Husband disabled from work; takes all wages to feed and clothe family; poorly educated; plainly dressed.

CIGARMAKERS, SAN FRANCISCO—HOME CONDITIONS.

No. 1. Lives with parents; gives wages to mother, who provides; seven in family; father a seaman; comfortable home; mother not compelled to work; keeps house; takes care of the children; been to public school; very neatly dressed.

No. 2. Divorced; husband a no account, worthless scamp; lives with mother, who owns her home; is poor; mother a dressmaker; been to school; not well dressed.

No. 3. Mother a widow; owns a three-story flat; rents two, upper and lower ones; lives in middle one; has a very comfortable support from rents; lives with mother; an only child; been to school; well dressed.

No. 4. Lives with grandmother; gives all money but \$1 50 per week to her; she provides for expenses; receives assistance occasionally from an aunt also; grandmother must have other means of support than what she makes, but does not know; well dressed; been to public school; lost time nursing grandmother.

No. 5. Lives with parents; father not in good health; does not work; four children work and support parents; graduate of public grammar school; not well dressed.

No. 6. Parents dead; lives with sister, who makes a nice, pleasant home for her; charges no board; can dress well; been to school.

No. 7. Lives with parents; father a plumber, and makes a comfortable living; three children live at home, and help parents; been to public school; well dressed; home in pleasant locality.

No. 8. Lives with parents; father an invalid; does no work; not very comfortable living is made; six in family; three help to support family; mother keeps house; never been to school; went one year to night school; poorly dressed; home in healthy locality.

No. 9. Lives with parents; father is a retired merchant; been to school, both public and convent; one brother works and lives with parents; he helps to support family; father does no work now, not necessary; well dressed; has comfortable, quiet home, with healthy surroundings.

No. 10. Lives with and gives wages to mother, who provides for the necessities; mother kind and good; comfortably dressed; good common school education. This is one of the sisters working with the Chinamen.

No. 11. Gives wages to parents; knows nothing of her expenses; well dressed; pretty good education; parents kind; good home, comfortably furnished.

No. 12. Lives with mother, a widow; five sons, who help to support mother; all live together in a comfortable house, with sufficient room for health; comfortably dressed; good grammar school education.

No. 13. Lives with parents; commenced work a few days ago; could not tell what would be given her at the end of the week; wages according to what she can do; healthy home; fair education; parents, working people; only plainly dressed.

No. 14. Gives all her wages to father; mother dead; father has three more children; all help and support themselves; can't tell about expenses; nothing saved; home comfortable, with four rooms; good education; well dressed; father sober and kind.

No. 15. Is a widow; one daughter, who is married; one works and helps to support the family; works in the same establishment with mother; they put wages together and use in common; cannot state the amount spent for clothing; all the rest go for food and home expenses, after rent is paid; nothing is saved; glad when ends meet; poorly educated; poor clothes; location, healthy; good house.

No. 16. Gives wages to parents, who provide clothing and other necessities; father not strong, but works when he can; one son, who helps to support family; live in healthy house; well dressed; can read and write.

No. 17. Both parents living; father works at cigar business; gives wages to parents, who are kind and provide well for her and family; good mother, who sees after the happiness and clothing of children; good common school education; well dressed; healthy, cheerful, happy home.

No. 18. Gives wages to mother, who provides everything for her; lives with parents; good house of four rooms; healthy, pleasant surroundings; fair education; dresses well; two sisters.

No. 26. Lives with parents; gives all wages to mother, who provides for five other children, who work and help parents; father old, can't work; all working and helping to make a comfortable home; been to public school and convent; very well dressed.

No. 27. Is divorced; husband lazy, and treated her badly; has been supporting self and child about two years; very well dressed; been to public school; lives with friends, who

are kind and charge little board, or it would be hard to make a living; been to public school; boarding place quiet and home like.

No. 28. All the wages given to parents, who provide all the necessities and luxuries; has a happy, healthy home; kind parents, who have three other children; father a laborer; well dressed; good common school education.

No. 29. Gives all her wages to mother, who is a widow; six other children; all able to work and support themselves, and help mother; mother gives her clothing, etc.; lives in two-story house, five rooms; pleasant surroundings; very well dressed, and well educated.

No. 35. Husband cruel; could not live with him; is divorced; lives with mother, who is kind; after paying board and lodging, all the rest goes for clothing and other necessities; saves nothing; glad to make ends meet; comfortably dressed; good education; comfortable home; healthy, quiet surroundings.

No. 36. Lives with parents; pays no board; spends all her wages for dress and other pleasures; saves nothing; has a good time generally; father and mother kind; pleasant home; good common school education; healthy, happy looking girl; dresses well; knows nothing of expenses.

No. 42. Knows nothing of expenses; gives wages to mother, who provides for all her wants; mother widow; keeps lodging house; five children; two go to school; others help mother; good common school education; well dressed; healthy locality and pleasant surroundings.

No. 43. Mother and daughter live together; mother a widow not able to work; only able to keep the house and do the sewing; live in comfortable house, four rooms; healthy locality; pays \$10 a month for rent; cannot state exact amount spent for clothing; after clothing, rest of earnings go for food and housekeeping expenses; no savings.

No. 44. Gives wages to mother, who feeds and clothes her, and does the sewing and housekeeping work; father, wharfman, who has other small children; another daughter who helps with parents; lives in house with six rooms; healthy location; good education.

No. 45. Lives with parents; father laborer; six children, all self-supporting; after paying board, gives all to mother, who provides clothing and pin money; well educated; well dressed; healthy locality; good house; sufficient rooms for comfort.

No. 46. Two sisters; rent house of four rooms; live together, and support old grandmother and little sister; elder ones keep house; all earnings go for support; live in healthy locality; good surroundings; well educated, and well dressed.

No. 49. Lives with parents; father a carpenter, doing good business; owns his home; has a family of six children; home a pretty cottage over the bay; educated in public school in Vermont; well dressed.

No. 50. Lives with mother, who is a widow; rents house; family of three children; not well educated; fairly dressed; complains of having to work with Chinese.

No. 51. Lives with parents; father is a laborer; he drinks hard, and often begs money of her to buy liquor; lives in upper part of house, poorly furnished; four children in family.

No. 52. Father old; mother in Napa Asylum, hopelessly insane; two sisters work to keep house and support father and one small sister; the two make a plain, comfortable living for all; a strong, healthy young woman used to work; public school education.

CIGAR BOX MAKERS—HOME CONDITIONS.

No. 1. Lives with aunt, who keeps house; not necessary to work; owns her own home and other property.

No. 2. Lives with mother, who does no work for wages.

No. 3. Lives with mother, who owns her home; has no other children to help family.

No. 4. She and two other children live with mother, and put wages together to support family.

No. 5. Lives with parents; father a peddler; makes very little; only for her wages, mother would have nothing; gives all to her.

No. 6. Lives at home with parents; gives wages to mother; father a shoemaker, but hardly makes enough to support self.

No. 7. Father a carpenter; lives with parents; gives wages to mother, who provides her with clothes.

No. 8. Mother a widow; three brothers work; all live with mother, she keeps house; all contribute toward the support of mother; well dressed; been to public school.

No. 9. Lives with parents; works to help them; gives wages to mother, who provides for her; plainly dressed; been to school very little.

No. 10. Pays \$7 per month for house rent, after that it takes every cent for food and clothes; plainly dressed; been to public school.

No. 13. Father an old worn out miner, not able to work; lives with parents; gives wages to mother, and she does the best she can; been to public school; neatly dressed.

No. 14. Lives with and gives wages to aunt, and she provides for her; knows nothing of expenses; plainly educated; neatly dressed.

No. 15. Mother a widow; lives with mother; she has two boys who help to support the family; they also give wages to mother; mother provides for her; neatly dressed; been to public school.

No. 18. Mother a widow; gives wages to mother; she is the oldest of several children; mother works when she can get it; father dead six years.

No. 19. Lives with mother; father dead a short time; just commenced work; four small children; wages to mother.

No. 20. Lives with parents, and gives wages to mother; she provides everything.

No. 21. She and husband board with parents; parents well off; dresses well; graduate of high school.

No. 22. Lives with parents; gives wages to mother, who provides; well dressed; graduate of grammar school.

CLEANING AND DYEING—HOME CONDITIONS.

No. 1. Lives with parents; father makes a good support for family; gives wages to mother, who provides for all; graduate of grammar school; well dressed.

No. 2. The family with whom she lives is quite homelike and pleasant; been to public school; well dressed.

No. 3. Gives all her wages to her sister, who provides for her; very well educated; well dressed.

No. 6. Mother, daughter, and brother live together; brother works, and helps to support them; well dressed, and well educated.

CALIFORNIA COTTON MILLS, OAKLAND—HOME CONDITIONS.

No. 1. Lives with parents, who own their house; gives wages to mother, who provides for all comforts, pleasures, and necessities; home comfortable; been to public school and convent; neatly dressed.

No. 2. Lives with parents, who own their own home; father not well; is a junk peddler; three sisters work and support father and mother; the three make a comfortable living; poorly dressed; been to public school; all give wages to mother, and she provides for them as she thinks best; knows nothing of expenses.

No. 3. Father owns ranch in country; mother owns home also; home comfortable; been to public school; very well dressed; six in family.

No. 4. Lives with parents; father owns home; father a bootblack; don't make much money; gives wages to mother, who provides; been to public school; plainly dressed; home comfortable.

No. 5. Lives with parents, who own their home; been to public school and convent; father makes a comfortable living; eight in family; very well dressed.

No. 6. Father a peddler, makes a poor living, but owns his home; gives wages to mother, who provides; two sisters working in mill; all help parents; eight children; poorly dressed.

No. 7. Lives with parents; four sisters work in mill and help to support the family.

No. 8. Only daughter and mother; mother prefers to work for wages; daughter not very strong; keep house; could give no correct account of expenses, but it takes all the wages to support the two; they rent a small cottage and make a comfortable home; educated in the East, and very well dressed.

No. 9. Was educated in Massachusetts; dresses very well; nice, quiet home in a boarding house.

No. 10. Lives with parents; father works; is a longshoreman; gives wages to mother, who provides for her; been to public school and convent; comfortably dressed; helps to support.

No. 11. Father owns home; gives wages to mother; she supplies with all necessities; one brother helps also to support; poorly dressed; been to public school.

No. 12. Lives with parents; father owns his home; works, and makes a good living; has three children; went to public school in Texas; very well dressed; home pleasant.

No. 13. Lives with parents; gives wages to mother; she provides; father works at little jobs now and then; two brothers work, and help to keep family; four children in all; well dressed.

No. 14. Had to work from early childhood; never went to school; neatly dressed.

No. 15. Rents a small house; she and husband live together; takes all wages to supply necessities; have other means, but it is not used; could give no account of expenses; well dressed; good education.

CRACKER FACTORY—HOME CONDITIONS.

No. 1. Lives with parents; gives most of wages to mother; been through grammar school.

No. 2. Lives with mother, who is a widow; mother keeps house, and is supported by four children; gives wages to mother, she provides everything; neatly dressed; been through public school.

No. 3. A young widow; well dressed; been through public school.

No. 4. Father owns home; makes a good living; lives with parents; gives wages to mother; she provides for all her necessities; pretty well dressed; public school education.

No. 5. Husband drinks; not unkind; well dressed; well educated.

No. 6. Father a teamster; makes a good living; gives wages to mother; she provides for all her necessities; well dressed; been through public school.

No. 7. Two sisters live together; common education; well dressed.

No. 8. Lives with aunt; saves nothing; mother and father dead; well dressed; been to public school.

CLOAK AND SHAWL—HOME CONDITIONS.

No. 1. Supported by parents; well dressed; been to public school.

No. 2. Gives wages to mother, who is a widow; has two children dependent; well dressed; been to public school.

- No. 3. Father insurance agent; well educated, and well dressed.
- No. 4. Lives with employer, who is kind; parents dead.
- No. 5. Lives with parents, who support her; well dressed.
- No. 7. Lives with father, but he does not make much on account of not being strong; has two sisters; fair education.
- No. 10. Father a carpenter; mother keeps house; gives wages to mother; well dressed.

DRESSMAKERS—HOME CONDITIONS.

- No. 1. Spends money as she pleases; good grammar school education.
- No. 4. Well dressed, and well educated.
- No. 5. Lives with parents; father dry goods merchant; been to public school; well dressed; gives wages to mother, who provides.
- No. 6. Lives with mother, who is a widow; been to convent school; also graduate of public school.
- No. 7. Two sisters live with friend in same room; been to public school; well dressed.
- No. 8. Mother a widow; father not dead long; gives wages to mother, with whom she lives; she provides as best she can; been to public school; dresses well.
- No. 9. Lives with mother; mother owns a ranch in country; been to convent school; well dressed.
- No. 10. Father owns his home; gives wages to mother, who provides for her; well dressed; been to public school.
- No. 11. Lives with parents; father groceryman; makes comfortable support for family; been to public school; well dressed.
- No. 12. Lives with parents, who live in nice home; helps to support one sister; well educated, and well dressed.
- No. 13. Nothing saved; well dressed; plain education.
- No. 14. Gives wages to mother, who provides; well dressed; good education.
- No. 15. Gives wages to parents, who provide for her; been to public school; well dressed.
- No. 17. Mother dead; dresses well, and well educated.
- No. 18. Been through grammar grade of public school; well dressed.
- No. 19. Well dressed, and well educated girl.
- No. 20. Well dressed, and well educated; widow; no children.
- No. 21. Father owns his home; several brothers work, and help to support father; been through grammar grade of public school; well dressed.
- No. 22. Lives with husband; dresses nicely; well educated; lost money in stocks.
- No. 23. Parents dead; been to public school; well dressed.
- No. 24. Saves all her wages; husband pays all expenses.
- No. 25. Lives with widowed mother; owns home; has other means of support.
- No. 26. Lives with parents; owns home.

FRUIT CANNING AND PACKING, SANTA CLARA COUNTY—HOME CONDITIONS.

- No. 1. Husband makes a good support, and provides everything; has a home in the country; is only living here to educate the children; works only during the fruit season; comfortably dressed; been to school; not necessary to work; could tell nothing of expenses.
- No. 2. Only works at this business because she is lonesome at home; has plenty of means to live on more than comfortably; well dressed; well educated; could give no account of expenses; home belongs to her.
- No. 3. She and husband live together; she saves all her wages, to buy a home; husband works for \$75 per month, and supports family very comfortably; have one child, nine years old; dresses well; been to school.
- No. 4. Is a widow; keeps house, and one sister lives with her; works as canner during the fruit season, and does plain sewing the other months; could give no correct statement of expenses; owns her home; makes quite a comfortable living for herself and child; neatly dressed; good education.
- No. 5. Lives with uncle, who supports her; knows nothing of expenses; only working during vacation; will return to school when it commences; uncle is having her educated for a teacher; wanted some pin money, and thought it an easy, nice way to make it; well dressed; home pleasant and healthy.
- No. 6. She is a teacher; only works in fruit factory in vacation, that is, about two months; could give no accurate account of expense after board was paid; dresses well; teaches in country.
- No. 7. Parents own their home, a nice cottage; father a machinist; makes a comfortable support; one brother works and lives at home; helps family also; lives at home with parents; been to public school; nicely dressed.
- No. 8. Lives with mother, who is a widow, and rents her home; other children live at home, and help to support mother; gives half wages to mother; only works during fruit season; educated at convent; well dressed; all working and giving part of wages to mother, enables her to have a nice home.
- No. 9. Lives with parents; father in railroad business; makes a good living; only works in the fruit season for pin money; spends all for clothing, and when more is needed calls on father; has one sister who works; well dressed; been to public high school; home a nice, pleasant cottage; after fruit season, remains at home, does no work.
- No. 10. The old lady rents one furnished room, at \$10 per month; does her own cooking and other work; only works in the fruit packing business during the fruit season, which

is six months of the year; is too old to do house work or hard work, but makes ends meet one way or another; is strong and healthy; comfortably dressed; been to public school.

No. 11. Husband and wife keep house; husband has a good business, and supports the family; makes a comfortable support for all; she saves all her wages; only works for wages during the fruit packing season; comfortably dressed; been to public school; does all house work, except washing.

No. 12. Left home; had trouble with father; could not live with him; only commenced present occupation; don't know if she will follow it through the season; well dressed; been to public school.

No. 13. Lives with parents in a nice cottage very comfortably; gives wages to mother, who provides; only works during vacation; is still going to public school; neatly dressed.

No. 14. Lives with mother, who is a widow, and works in fruit factory when able; mother is in poor circumstances; gives wages to mother; she provides; works in fruit factory all fruit season, six months; the other six months does house work, from \$10 to \$12 per month and board; neatly dressed; been to public school; all together make a nice home.

No. 15. Lives with parents in a beautiful cottage; father a carpenter; not necessary for her to work; only does it because she is lonesome at home, and rather make her own pin money; gave up typesetting because employer would not give two or more weeks' vacation to entertain company; well dressed; been through grammar grade of public school.

No. 16. Is on a visit to her grandmother; never worked before; been to school nearly all her life; is only working now during vacation for a little pin money; will return to school when vacation is over; will finish at the San José Normal School; grandmother in good circumstances; owns her home; well dressed.

No. 17. Keeps house, but could give no exact account of expenses; saves nothing; has two daughters who work and help support the family; all working make a comfortable living; while husband was living, did not work for wages; well dressed.

No. 18. Mother works in same factory; has been keeping boarders; may again after fruit season is over; one sister, a dressmaker, who helps parents; father sick; can't work much; gives all wages to mother; been to State Normal School; neatly dressed; quiet, healthy home; helps mother at home, when she is keeping boarders; sometimes makes \$1 a day as a clerk; also taught school for a short time.

No. 19. Mother dead; father works on a farm; would rather work in city and pay her own board, than live in country; after packing season is over, does sewing, or any light work; could not give exact amount made at other occupations; been to public schools; very well dressed; boards in pleasant, quiet family; could not tell exactly what was spent for clothes.

No. 20. Rents furnished room; boy goes to school; home pleasant.

No. 21. Husband sells fruit; saves half her wages; both save.

No. 22. Father owns a farm; comfortable home; no necessity to work.

No. 23. Lives with parents; father well off; owns fruit farm; works for pin money; well dressed and educated.

No. 24. She has to support the family; husband lazy, trifling fellow; not sick, but will not work; willing to stay at home, and mind the children; could not tell anything about expenses; right hard to make a living; one son works, and helps mother; plainly dressed; poorly educated; worked before marriage; some years after marriage, did not work; been at present occupation only a short time.

No. 25. Widow; one daughter; makes good living; knows nothing of expenses; well dressed and educated.

No. 26. Lives with parents; father has fruit ranch; gives wages to mother; well dressed.

No. 27. Works only in vacation for pin money; returns to school when it opens; attending Normal School, to be a teacher; parents comfortable; well dressed.

No. 28. Recently married second time; husband provides; knows nothing of expenses; has two daughters working in factory; all trying to save enough to buy a home.

No. 29. Lives with parents, who own home and fruit ranch; sells fruit to factories; does not work after fruit season; works for pin money.

No. 30. Lives with parents, who are rich; own fruit ranch; only wants pin money; well dressed; goes to school after vacation.

No. 31. Works only during fruit season; very poor; has a widowed daughter, with two children, who live with her; all work in fruit factory; children go to school the other months; daughter in poor health; all her life it took what she earned to live.

No. 32. Lives with mother, and gives her wages to her; mother works out by the day; she gets from \$1 25 to \$1 50 per day; owns her home; works during vacation, and returns to school; neatly dressed.

No. 33. Lives with parents; gives wages to mother, who provides for all her necessities; father, brickmason; owns home, which is comfortable; well dressed.

No. 34. Husband a bookkeeper; well off; owns home; work not necessary to make a living; well dressed and educated.

No. 35. Lives with mother, who is a widow; mother works in same factory; two other daughters work and all live together; they also put wages together and help each other; could give no accurate account of their expenses; a comfortable living is made by hard work; after fruit packing season is over a job of any kind is willingly done by this woman.

No. 36. Parents dead; has an uncle who is Mayor of * * * and worth \$100,000; promised to help her if she would come West, but does not; well dressed, nice looking girl; boarding place quiet and homelike; when not employed in the fruit packing factory she sews and cooks.

No. 37. Lives with parents; gives wages to mother who provides for all necessities and pleasures; father plumber; owns his home; makes good support; not necessary for her to work; will only work during the season of fruit; will return to school; well dressed; father has family of four children; two work.

No. 38. Has not been from the East longer than two years; husband a laborer, but can't get work as readily as a woman; consequently makes but little; she has supported the family since they came West; works at fruit packing during the season; then at day work wherever she can get it; makes enough to support them all, with the support of one son, who is a painter; well dressed; well educated; could give no statement of expenses; will not go in debt.

No. 39. Lives with grandmother, who owns her home, and has means of support; works at fruit factory during vacation, to help support herself; gives wages to grandmother, who provides for her; knows nothing of expenses; going to school when it commences; neatly dressed; grandmother kind.

No. 40. Lives with father; mother dead; one sister works and helps to support the family; she keeps the house; father a laborer; gives his wages to daughter; she provides; makes comfortable home for all; neatly dressed.

No. 41. Is a widow, with one daughter thirteen years old, who works at the fruit factory during the season, which lasts about six months, then goes to school; she can make about as much as her mother; mother manages to live pretty comfortably on what both make; plainly dressed, and plainly educated; could not tell of expenses; took all to live.

No. 42. She and one daughter live together; husband cuts wood up in the mountains, and is seldom at home; daughter not strong; stays at home and does the house work while she makes the money for their support, by working in the fruit factory in the fruit season, and does odd jobs the other six months; could give no exact account of expenses; poorly dressed and educated.

No. 43. Mother lives with her, and takes care of the children when at work; lost one arm while working in the woolen mills; does house work when not in the fruit factory; been to public school; well dressed; a smart, thrifty woman; could not give exact amount of expenses, but saves something every year.

No. 44. Lives with parents, and gives wages to them; has not finished going to school; will only work the fruit season; mother works in the factory also to help through the winter; father is a carpenter, but is sick and not working; neatly dressed.

No. 45. Lives with mother, who is a widow; mother and three sisters work; gives wages to mother, who provides; all working and helping to make a good living; mother only works during fruit season; the others work the year round.

No. 46. Father moved to San Diego on a farm; she remained to finish school; only works during the fruit season; father clothes her and furnishes her with other means when necessary; could not tell about expenses; well dressed.

FRUIT CANNING AND PACKING, SAN FRANCISCO—HOME CONDITIONS.

No. 47. Lives with husband, who has small business for self; father works in fruit factory; cannot speak English.

No. 48. Lodges by self; cooks for self; not very strong.

No. 49. Lives in two rooms; son lives with her; helps her with expenses; rent \$4 per month; son was sick three years; does work for private families when not earning from \$10 to \$12 in factory; in doing this work she is given her board.

No. 50. Occupies five rooms; two children earn wages; rest are sick or small; plainly dressed; is seamstress when not in factory, earning not more than \$4 to \$5 per week.

No. 51. Lives with mother, two brothers, and one sister; mother works in fruit factory; been to public school; gives one half of wages to mother, rest for clothes; when not in factory, works in private family for from \$10 to \$12 per month.

No. 52. Lives in two rooms; three daughters, who work in same factory; dresses poorly; does house work when not in factory.

No. 53. Husband silver plater; makes \$100 per month; the two put money together; dresses well; good education; only works five months, at home the rest of the year.

No. 54. Rents part of a house of five rooms; lives with parents; very poorly dressed; can speak very little English.

No. 55. Has two children; husband a fisherman; poorly dressed; would not tell anything about home.

No. 56. Rents two rooms; speaks little English, and could not understand questions.

No. 57. Rents two rooms; slovenly dressed; would not answer.

No. 58. Pays half her earnings for board; poorly dressed.

FRUIT BASKET MAKERS—HOME CONDITIONS.

No. 1. Lives with parents; father owns home; well off; not necessary for her to work; gives wages to mother; she provides for her; plainly dressed; public school education.

No. 2. Lives with mother, who is a widow; she and one brother support mother; mother uses wages as she thinks best; been to public school; plainly dressed.

No. 3. Lives with parents; father works; her wages go towards the support of family; been to public school; plainly dressed.

No. 4. Father dead; lives with mother and grandmother; the only child; wages go towards the support of family; been to public school.

No. 5. Lives with parents; father a carpenter; makes a comfortable living; has four children; gives wages to mother; she provides for her; been to public school; well dressed.

No. 6. Lives with parents; large family; very poor; father a teamster; gives wages to mother; plainly dressed.

No. 7. Very well educated; been to public school in Missouri; father a laborer; makes a pretty good living for family; gives wages to mother, who provides for her.

GLOVEMAKERS—HOME CONDITIONS.

No. 1. Lives with parents; father a carpenter; gives wages to mother.

No. 2. Lives with parents, who own their home; good education; well dressed.

No. 3. Mother and daughter live together; been to public school.

No. 4. Lives with parents; father owns home; been to public school; well dressed.

No. 5. Lives with sister; well dressed; been through public school.

No. 6. Lives with mother, who is a divorced widow; gives wages to mother, who provides for all her necessities; plainly dressed; been to public school.

No. 7. Lives with parents in a quiet, healthy home; father a shipbuilder; makes a comfortable living; gives wages to mother; well dressed; been to public school.

No. 8. Gives wages to mother, who provides; well dressed; well educated.

No. 9. Father a merchant; makes a good living; lives with parents.

No. 10. Father owns a home in Oakland; he is a shipbuilder.

No. 11. Lives with parents; dresses fine; well educated.

No. 12. Husband dead; saves nothing; been to public school; well dressed.

No. 13. Lives with parents, who own their home; mother provides for all her wants; well dressed; been to public school.

No. 14. Husband and wife; live together; been to school; well dressed.

HARNESSMAKERS—HOME CONDITIONS.

No. 1. Husband works in harness business; supports neither wife nor child; good education; well dressed.

No. 2. Good public school education; dresses well, and saves nothing.

No. 3. Lives with parents; gives wages to mother; well dressed; been to public school.

No. 4. Lives with parents; gives wages to mother; has nothing to do with expenses; well dressed; been to public school.

No. 5. Father owns his home, and a small milk ranch; dresses well; been to public school.

No. 6. Gives wages to mother; lives with mother; well dressed; good education.

No. 7. Lives with mother, who is a widow; been to public school; well dressed; mother uses wages as she thinks best.

No. 8. Gives most of wages towards the support of mother, who is not able to work; saves nothing; good grammar school education; lives with mother.

No. 9. Lives with parents; gives wages to mother, who provides all the necessities and pin money; well dressed; common school education.

HOOPSKIRT FACTORY—HOME CONDITIONS.

No. 1. Lives with parents; father drinks, and does not earn much for family; three younger children; poorly dressed; fair education.

No. 2. Mother a widow; two children at home; very poor; fair education.

No. 3. Father a butcher; makes good wages; well dressed; good education.

No. 5. Is quite poor; husband no account; common school education.

JAPANNING AND TINWORK—HOME CONDITIONS.

No. 1. Lives with parents; well dressed.

No. 2. Lives with parents; well dressed; home pleasant.

No. 3. Lives with parents; one brother and one sister help to support father and mother; father was a sick nurse, but is now too old, and cannot follow it for wages; all helping to make a comfortable living; been to public school; well dressed.

No. 4. Parents dead; has one sister, a dressmaker; both live in the same place; father been dead two months; been to public school; well dressed.

No. 5. Lives with parents; gives wages to mother; she provides for all her necessities; one brother and one sister help to support father and mother also; father sells matches.

No. 6. Happily married; both put wages together and live very comfortably; well dressed; been through grammar school.

CALIFORNIA JUTE MILLS, OAKLAND—HOME CONDITIONS.

No. 1. Lives with parents; gives wages to them; mother provides; father has broken leg; she and one brother support family; poor, but live in nice cottage; mother strong; keeps house and does the washing.

No. 2. All wages to parents; supports self and others.

No. 3. Gives all wages to parents; three sisters and two brothers work and do the same; neither one of the parents works; mother keeps house, and provides for all when a new hat or new dress is wanted; dresses well enough for the dirty work; educated in Scotland; plain education.

No. 4. Husband and wife live together, put wages together, and share expenses together; each saves \$20 per month; have two children; the two make a comfortable living; plain education; very well dressed.

No. 5. Lives with mother, who is a widow; brother works and helps to support also; gives wages to mother after the one meal a day is paid for; well dressed; well educated.

No. 6. Lives with parents; pays no board; father works; mother keeps house; been to public school; well dressed.

No. 7. Mother and daughter live together; mother keeps house; is a widow; girl's wages goes for the support of both; could give no account of expenses; educated in Scotland; plainly dressed.

No. 8. Been married about two years; husband works; they put wages together and supply the house with necessities; make a comfortable living; plainly educated.

No. 9. Lives with father, who owns home; mother owns ranch in country; keeps house for father; both put wages together and live comfortably.

No. 10. Mother dead; lives with father, who is a laborer; she and one sister help to support father and a large family of children; make a comfortable living; poorly dressed.

No. 11. Lives with parents; father works; makes comfortable living; home owned by father; gives wages to mother.

No. 12. Gives wages to parents, with whom she lives; they have a comfortable home owned by father; been to public school; comfortably dressed.

No. 13. Lives with mother, who is a widow; an older sister works in same factory; both give wages to mother for support of the family; very poor; mother works for families; has one brother working in factory, who gives wages to mother also; poorly dressed.

No. 14. Lives with parents, who own home; father does no work; gives wages to mother; nice cottage.

No. 15. Lives with parents, who are negroes; father a whitewasher by trade; makes a pretty good living; been to public school; very well dressed.

No. 16. Lives with parents, who own their home; father works and makes a comfortable living; gives wages to mother, who provides; has another sister working in the mill; well dressed.

No. 17. Father a laborer; one brother and sister work and help parents; gives wages to mother; she provides; been to public school; poorly dressed; well enough for the dirty place.

LITHOGRAPHERS—HOME CONDITIONS.

No. 1. Lives in Oakland; gives wages to mother, and she provides; well educated; well dressed.

No. 2. Parents dead; lives with aunt, who acts as mother; gives wages to aunt, who provides for her; well dressed; been to public school.

No. 3. Lives with parents; gives wages to mother, and she provides for her; been to public school; father works, and makes good support; well dressed.

No. 4. Lives with parents; father works, and, with the assistance of his children, makes a comfortable living; gives half of her wages to the support of the family; been to public school; neatly dressed.

No. 5. Two brothers and two sisters; live together, and make a comfortable, pleasant home; all do their part towards support; been through grammar school; neatly dressed.

No. 6. Lives with parents, who own their home; gives wages to mother, and she provides; been to public school; well dressed.

No. 7. A well dressed and well educated young woman.

LAUNDRIES—HOME CONDITIONS.

No. 1. Does not save anything; lives with husband, but supports herself.

No. 2. Lives with employer; spends all wages on dress and pleasure.

No. 3. Room good size; takes all earnings to support self and child.

No. 4. Lives with employer in the laundry; well dressed; good education.

No. 5. After three months will receive wages; lives with employer; well dressed; good education.

No. 6. Husband sick and does not work; saves nothing.

No. 7. Lives at home; husband works; saves nothing; dresses well.

No. 8. Lives with husband; they put money together to bear expenses; neatly dressed; saves nothing.

PAPER BOX MAKERS—HOME CONDITIONS.

No. 1. Left husband, and took children; lives with mother-in-law, who is kind; comfortably dressed; public school education.

No. 2. Lives with father, mother dead; one sister keeps house; father works; she helps father to support; neatly dressed; been to public school.

No. 3. Lives with parents; father well off, owns property; been to public school; well dressed.

No. 4. Lives with parents; father a butcher; owns his own home; gives wages to mother, who provides; been to public school; comfortably dressed; seven children.

No. 5. Lives with parents; own their home; well off; not obliged to work; been to public school.

No. 6. Father owns his home, and works; makes a comfortable living; lives with parents; gives wages to mother; been to public school; well dressed.

No. 7. Father owns his home; gives wages to mother, who provides for her; been to public school; well dressed.

No. 8. Lives with parents; neatly dressed; been to school.

- No. 9. Lives with parents, and father owns home; gives wages to mother; well dressed.
 No. 10. Lives with parents; gives wages to mother, who provides; well dressed; been to public school.
 No. 11. Lives with parents; gives wages to mother.

PRINTERS—HOME CONDITIONS.

- No. 1. Lives with mother, and also gives wages to mother; has other means of support; been through grammar school; well dressed.
 No. 2. Lives with mother; gives wages to mother; been through grammar school; well dressed; mother a widow.
 No. 3. Lives with parents; is not compelled to work; only works for pin money; gives wages to mother, but calls on her when she wants it to spend; been through grammar school; well dressed.
 No. 4. Lives with parents; gives wages to mother, who provides for her necessities and her pleasures; graduate of grammar school; well dressed.
 No. 5. Mother a widow; she and a brother support mother; gives all wages to mother, who keeps house and provides for the children; graduate of public school; well dressed.
 No. 6. Gives wages to mother, who uses it for clothing, etc.; graduate from public school; well dressed.
 No. 7. Mother (a physician) is a widow and has four other children dependent, but makes a comfortable living; mother uses wages as she thinks best; been to public school; well dressed.
 No. 8. Lives with mother, who is a widow; has three other children who help to support family; gives wages to mother; she provides for her and uses wages as she thinks best; been through grammar school; well dressed.
 No. 9. Lives with parents; father a painter; has other children working; gives wages to mother; well dressed; been to public school.
 No. 10. Well dressed; well educated; parents dead.
 No. 11. Only child; gives wages to mother, who uses it as she thinks best; well educated and well dressed.
 No. 12. Lives with mother; gives all wages to mother, who provides for all necessities; well dressed, and has had good education.
 No. 13. Gives wages to grandmother; knows nothing of expenses; grandmother provides for her; good education; well dressed.
 No. 14. All wages left after paying board she gives to mother, who provides for all her necessities; well dressed; good education; saves nothing.
 No. 15. Gives all wages to mother and lives with parents; knows nothing of expenses; well dressed; good education.
 No. 16. Gives wages to mother, who is a widow, who provides for her and dresses her well; good education.
 No. 17. Lives with mother-in-law; husband supports her entirely; only works to pass time; saves all her wages; well dressed; good education.
 No. 18. Lives at home with mother and stepfather; gives all wages to mother for support of family; well educated.
 No. 19. Lives at home with parents; father does not work; well educated.
 No. 20. Lives at home with parents.
 No. 21. Is well educated; lives in nice house owned by father; only works for pocket money and to be independent; buys her own clothes.
 No. 22. Lives at home with parents and brother; father a doctor; well educated.
 No. 23. No mother; nice boarding house; poor; father no good.
 No. 24. Lives at home; father dead; mother well off.
 No. 25. Well dressed; well educated; parents dead; boarding house nice home.
 No. 26. Lives with mother, who has a nice home and means of support; brothers work and help the family; mother a widow; graduate of Normal School; well dressed.
 No. 27. Lives with parents; father a dray driver, owns his home, makes a good support for the family; well dressed; been through grammar grade of public school.
 No. 28. Lives with mother, who is a widow, owns her home, and has means of support; graduate of Normal School; well dressed.
 No. 29. Lives with parents, who own their own home, a nice cottage; father works, makes a comfortable support for family of five children, two of which are self-supporting; well dressed and educated.
 No. 31. Lives with parents in a quiet little home in Oakland; graduate of High School; dresses very well.
 No. 32. Lives with parents; father a shoe merchant; gives wages to mother, who provides her with clothes, etc.; graduate of High School.
 No. 33. Graduate of High School; lives with parents, who support her; well dressed.
 No. 34. Father too old to work, is a carpenter by trade; lives with parents; graduate of High School; gives wages to mother, and she provides for all her necessities.
 No. 35. Lives with parents; father shoe merchant; gives wages to mother, and she spends as she thinks best; well dressed; graduate of High School.
 No. 36. Lives with parents, who are good to her; graduate of grammar school; gives wages to mother, who provides for all her wants; well dressed; nothing is saved.

SALESWOMEN—HOME CONDITIONS.

No. 1. Lives with aunt, in healthy locality; pays her own board; well dressed; been to public school.

No. 2. Lives with parents; parents old; she helps to support them; well dressed and well educated.

No. 3. Father, paper carrier; well dressed; been to public school.

No. 4. Lives with brother of the proprietor; been to school.

No. 5. Lives with parents and gives wages to mother; father has means; not necessary for her to work; dresses fine; graduate of a Catholic institute; saves nothing.

SHIRTMAKERS—HOME CONDITIONS.

No. 1. Only commenced work a short time ago; works that she may have her own pin money; well dressed and well educated.

No. 2. Was educated in a convent; parents dead; well dressed.

No. 3. Parents dead; lives with sister; lost time last year from sickness; well educated and well dressed.

No. 4. Parents dead; well dressed; educated in public school.

No. 5. Spends wages as she pleases; well dressed; well educated.

No. 6. Lives with parents who own their own home; gives wages to mother; been to public school.

No. 7. Husband a carpenter; makes a good living; well dressed; good grammar school education.

No. 8. She and husband live with mother; husband works and makes a good living; well dressed; been to public school.

No. 9. Plainly dressed; poorly educated; saves nothing.

No. 10. Gives wages to mother; knows nothing of expenses; mother provides everything; father works; makes a good living; been to public school; well dressed.

No. 13. Lives with parents; father an engineer; gives all wages to mother; she provides for all her wants; dresses well; been through grammar school.

No. 14. Husband has consumption; fairly educated; plainly dressed.

No. 15. Lives with parents; gives wages to mother; she provides for all.

No. 16. Married; husband and wife bear expenses together; well educated and well dressed.

TAILORING—HOME CONDITIONS.

No. 1. Lives with parents; father loads ships, and makes a good living; public school education; well dressed; spends all.

No. 2. Lives with mother, who is paralyzed, but has means of support; very well dressed; been to public school; takes all her wages to support child and self; saves nothing.

No. 3. Lives with parents, and gives wages to mother, who provides for all her wants; good, kind parents; been through grammar school; well dressed.

No. 4. Lives with parents in a nice house; well educated, and well dressed; spends all her earnings, after board, for pleasure.

No. 5. Lives with mother, who is a widow; mother is a sick nurse, but is not always employed; gives wages to mother, who can only get the necessities of life.

No. 6. Home, upper flat; father works at dockyard; gives wages to mother.

No. 11. Home comfortable; mother and two other children live together; father drinks; well educated; dresses very well.

No. 12. Could tell nothing of expenses; dresses good; has good education.

No. 15. Lives with parents; well dressed; spends wages as she pleases, saves nothing; well educated.

No. 19. Lives with parents; graduate of grammar school.

No. 20. Good education; well dressed.

No. 21. Lives with parents; been to public school; dresses well.

TRUNK AND VALISE MAKERS—HOME CONDITIONS.

No. 1. Lives with parents, who own their home; father a machinist, who makes a fine living for all; has eight children; gives wages to mother, who provides for all her necessities; well educated, and well dressed.

No. 2. Father works in woolen mills; makes a good living; gives wages to mother, who attends to all her wants.

No. 3. Father is clerk in tobacco store, makes a good living; four in family; been to public school; well dressed.

No. 4. Lives with mother, who is divorced; she keeps a small milk dairy; well dressed; public school education.

No. 6. Father intemperate; mother looks after house; poorly dressed; not well educated.

UPHOLSTERING—HOME CONDITIONS.

No. 1. Lives with mother, who is a widow, and dependent on self and one brother; well dressed and well educated.

No. 2. Graduate of High School; well dressed.

No. 3. One son works, and does the greater part of supporting; been to public school; well dressed.

- No. 4. Lives with mother, who is a widow; two sons work, and live with mother, and help to support; been to public school.
- No. 5. Very well off; been to public school.
- No. 6. Educated in New Jersey; well dressed.
- No. 7. Lives with aunt, who keeps house; well dressed; well educated.
- No. 8. Lives with parents; gives wages to mother.
- No. 9. Lives with mother, who is a widow; two young children; good education.
- No. 10. Mother dead; father idle, and fond of drink; well dressed.

UMBRELLA MAKERS—HOME CONDITIONS.

- No. 1. Lives with parents; father works; makes a good living; gives wages to mother; dressed well; been to public school.
- No. 2. Lives with parents; father works; gives wages to mother; well dressed; been to public school.
- No. 3. Lives with mother, and gives wages to mother, who is a widow; educated in a convent; well dressed.
- No. 4. Plainly dressed; poorly educated.
- No. 7. Lives with mother; father drinks, and earns very little; five children to support; gives all wages to mother; poorly dressed; not well educated.

WINERY, SAN JOSÉ—HOME CONDITIONS.

- No. 1. Lives with parents; father a merchant in San José, now traveling for his health; just finished at the Normal School; father very well off; don't have to work; well dressed.
- No. 2. Has income more than required for support; well educated and well dressed.
- No. 3. Lives with parents; father a merchant; works only for pin money.
- No. 4. Mother a widow, well off; other means of support; nice home in country; gives wages to mother; well dressed.
- No. 5. Graduate of High School; uses wages as she likes; not necessary for her to work; father a merchant; well dressed.

GOLDEN GATE WOOLEN MILLS, SAN FRANCISCO—HOME CONDITIONS.

- No. 1. Lives with parents who own their home, which is a large, old-fashioned house, out of the city proper, and on a broad avenue; father failed in the brewing business; children had to go to work; gives wages to mother, who looks after her welfare; father not working; plainly dressed; good education.
- No. 2. Lives with parents in a cosy little cottage; gives wages to mother, who supplies her wants and pleasures; dresses well; grammar school education.
- No. 3. Two sisters and brother own the home; brother married; sisters live with him; parents dead; pretty cottage; well dressed; a good grammar school education.

SAN JOSÉ WOOLEN MILLS—HOME CONDITIONS.

- No. 1. Lives with parents; father works on thrashing machine; has nice house; pays \$15 per month rent; pays mother a certain amount, and knows nothing of expenses.
- No. 2. Lives at home with parents and sisters; does not have to work, but does it so as to get clothes and other things which her parents would not be able to give her; father is a mechanic; two sisters work; good education.
- No. 3. Lives with parents at home; father laboring man; girl works to help support family; knows nothing of expenses.
- No. 4. Lives at home with mother; father dead; mother owns home; girl works only for money to buy dress; knows nothing of expenses; well educated.
- No. 5. Lives at home with her husband; knows nothing of expenses, except that it takes all of her's and her husband's to support themselves; husband a laborer.
- No. 6. Father deserted mother, who is sick most of the time; brother does everything for her; all her money goes to doctor; knows nothing of expenses.
- No. 7. Lives with parents; works only for money for clothes; knows nothing of expenses.
- No. 8. Has twelve brothers and sisters; father works on farm; gives all wages to mother; knows nothing of expenses; two brothers and two sisters working in the same mill.
- No. 9. Lives with parents; well educated; father works on a thrashing machine.
- No. 10. Lives at home with mother; father dead; gives wages to mother; knows nothing of expenses; mother works out; lives very badly, and apparently poor; but little education.
- No. 11. Lives in boarding house of five boarders; very comfortable; could support herself well if mill ran all the time; she is sick and should be in hospital; has no relatives.
- No. 12. Lives with parents; four brothers and sisters work and give wages to mother; father don't work; have two rooms for seven people.
- No. 13. Lives with parents; one sister working in same factory; all wages to parents; helps to support family; father works out by the day; very poor; knows nothing of expenses.
- No. 14. Father owns house of eight rooms; well educated; all earnings to parents; knows nothing of expenses.
- No. 16. Lives with parents; father is a mechanic; mother does not work; only works for pin money; well educated; knows nothing of expenses.

CHAPTER III.

WAGES PAID TO WORKINGWOMEN.

The rate of wages paid to women in California does not compare so favorably with the rates paid in the Eastern States as do the wages of men, for the reason that Chinese come more into competition with the women than with the men. This is especially the case among seamstresses, and in nearly all our factories. The coolie is the irrepressible foe of the female wage earner in every department of labor which requires merely the skillful use of hand and eye. He will cook, wash, iron, sew, and do everything in the line of work which, in other climes and under more favored conditions, is considered the exclusive province of woman. In other lines of labor the wages paid to females in this State are generally higher than elsewhere, such as teachers, artists, saleswomen, clerks, etc. As an offset to this, rent, fuel, and clothing cost more in California than in the Eastern States. One great advantage, however, which all our wage earners in California enjoy, is that they can work all the year round, not being compelled to lay up by intense heat in summer or extreme cold in winter. Inspection of the table giving the wages of females will show that the tendency in every field of manual labor in which a woman can engage is to limit her to a dollar a day. At this rate a self-supporting woman has all she can do to make both ends meet. It is a never ending struggle with her to procure the necessities of life without the means to lay anything by for a rainy day. She has to pay, at the lowest, from four to five dollars a week for board and lodging, which leaves her a margin of only from one to two dollars a week for clothing, car fare, and all other expenses.

A woman who has to depend upon her needle for a living is not better off in this State than the needlewoman in the Eastern States. In some departments, such as shirt-making, she is actually worse off. Where a woman can do the work required she will usually be employed at a much lower rate of wages than what would be offered to a man, or what a man would accept. The supply of female wage earners bears a far greater proportion to the demand than in the case of males. This tends greatly to keep woman's wages down. Men complain that as the sphere of workingwomen increases it makes inroads upon their lines of labor, with a consequent reduction of wages. Tailors, boot and shoemakers, bookbinders, printers, and other mechanics feel the result of this competition. If women would or could uphold the standard of wages the men would not have such reason for complaint. The keen rivalry for the means of living forces them to offer their services at rates far below the standard paid to men in the same line of business. Salesmen employed in dry goods, fancy goods, and similar establishments, complain that women offer to take their places at from one half to one third of the salaries which they receive. Instances are frequent where a young man and woman standing side by side in the same department, the former receives double the salary paid the latter. It was given in evidence before me that in a certain large printing establishment in Oakland, male proof readers were paid \$18 per week, while female proof readers were paid only half that sum, or \$9 per week. In the same establishment journeymen compositors were paid \$15, while journeywomen were paid only \$9 per week. The result of such competition is generally the lowering down of the men instead of the leveling up of the women. Men are by such a process often forced to quit the field and seek new pastures. Some trade organizations find it to their best interest to encourage women

of their craft to join their unions. The Typographical Union is an instance of this commendable course. By stretching out the hand of fellowship to female compositors, and sustaining them by all the means at their command in demanding full Union wages, they level up the woman and maintain the standard of wages for both. Equal work, equal pay, is the motto of the Typographical Union.

MALE AND FEMALE WORKERS COMPARED.

If a man's work surpasses the woman's in finish or strength, as in the tailoring business, of course he deserves and should receive a higher rate of compensation. Salesmen are preferred to saleswomen in our large dry and fancy goods houses, because, as the proprietors of some have so informed me, they have more tact and take more pains to sell goods than the women. Men are naturally not so disposed to fritter away the time (which in a manager's eye is money) in gossip with customers as women.

A prominent dry goods merchant of San Francisco said to me: "Women make excellent saleswomen in some departments—cloaks for instance—but there her usefulness in our line of business ends. She cannot manage the stock nor keep her department in such a well ordered condition as a man. For this reason in eastern houses, where women have displaced men behind the counter, it takes nearly twice the number of the former to do the work, and then," said he, "the departments do not present the neat, business-like appearance they do when managed by men. Women are not so subject to discipline as men, and for that reason must be constantly watched." In the dry goods houses of Los Angeles women are extensively employed as saleswomen, but in San Francisco, Sacramento, and other cities, this is not the case except in a few establishments.

While men glovemakers are paid from \$15 to \$25 per week, women are paid only from \$5 to \$12. Candymakers receive: men, \$9 to \$18 per week; women, \$4 to \$10 per week; bookbinders: men, \$18 to \$24; women, \$9 to \$12; bagmakers: men, \$15 to \$20; women, \$7 to \$12 per week. Salesmen in dry goods and fancy goods, and similar stores, have salaries generally running from \$50 to \$100 per month; saleswomen, from \$20 to \$50.

Much of this is owing, no doubt, to the surplus of available female labor over that of male, and much is owing also to the want of organization among the women themselves. There are many girls whose parents can support them, and who work only for the sake of earning pin money. They do not have to depend upon their salaries, and consequently can afford to work cheap. By so doing they cut down the wages of those who are obliged to live upon their earnings.

In a great many occupations the ruinous competition of Chinese labor has degraded and lowered the price of white labor. As an illustration of this fact, by reference to the tabulated rates of wages it will be seen that girls are paid in some establishments from 60 cents to \$1 85 per dozen for making shirts, prices varying according to quality. One dollar and seventy-five cents may then be considered a good price for making a dozen shirts. In a dozen shirts there are four hundred and fifty yards of tucking, seventy-two yards of seams, thirty-two yards of hemming, thirty-four yards of gathering back, thirty-six yards of bands, twenty-four yards of bands over gathering, making six hundred and thirty-six yards of sewing—price, \$1 75. Out of that they pay for thread, 50 cents. They must go and get the material, which is cut for them, and take it back home; car fare is 10 cents; net result, \$1 15. The best workwomen cannot make over two and a half dozen, which amounts to \$2 87 for the week's work. The ordinary

shirt with cuffs has eleven buttonholes, three worked eyeletholes, three buttons and two gussets to sew on. In other words, they are required to make one hundred and thirty-two buttonholes, thirty-six eyeletholes, and sew on thirty-six buttons and twenty-four gussets, all of the work to be well done, for \$1 50. What must be the hard fate of the girl who has to do all this amount of labor for the paltry sum of 60 cents, for that is the rate paid for some work.

WOMEN AS TELEGRAPH OPERATORS.

In employments where nervous energy and power of brain are brought into direct competition, as in telegraphy, the man is usually the better worker. Mr. Thomas O'Reilly, prominent in the Telegraphers' Union of America, a gentleman of great experience in his profession, says in this connection: "Women are engaged in the profession of telegraphy to a considerable extent; but the average salary of female operators, although they are required to work the same number of hours per day, is much less than the average salary of male operators." In reply to the question as to whether, generally speaking, females are as good as males, Mr. O'Reilly says: "Well, with all due deference to the capabilities of the opposite sex, I do not think so. While there are many capable and expert in the profession, their numbers are limited. In cases where female operators do equally as good work, they do not receive the same remuneration, although I am decidedly of the opinion that they should. In fact, one of the stipulations in the bill of grievances in 1883 was 'equal pay for both sexes.' Female operators are not usually as successful as those of the opposite sex, but it is because of their physical inability only, and not for any lack of skill. It is not to be expected that their powers of endurance would enable them to perform the excessive work done by male operators."

WOMEN AS TEACHERS.

As an instructor of youth woman has won her place to stand upon the same plane as man, yet in most States of the Union she receives a much lower rate of compensation. It is to the credit of California that a law has been placed on her statute books to prohibit such unjust discrimination, which reads as follows: "Females employed as teachers in the public schools of this State shall in all cases receive the same compensation as is allowed male teachers for like services, when holding the same grade certificates."

SALARIES OF FEMALE SCHOOL TEACHERS.

The average monthly salary paid to female teachers throughout the State during the last school year was \$64 12, and the average to female teachers in San Francisco, \$75 16. Very few schools pay below \$50 per month. The length of time for which school is maintained each year varies in different parts of the State from six to ten months. For every position at all desirable in the schools there are many applicants, and in San Francisco large political influence is generally required to secure the lowest grade class in our public schools.

Each of the fifty-two counties has its own County Board of Education, which examines teachers and grants certificates of three grades: 1. Grammar School course certificates, valid for four years, and authorizing the holder to teach in a High or Grammar School; 2. Grammar grade certificates, valid for three years, and authorizing the holder to teach a Grammar

or Primary School; 3. Primary certificates, valid for two years, authorizing the holder to teach a Primary School. The certificates so issued are valid in the counties only in which they are granted. The only credentials from other States upon which County Boards may issue certificates without examination, are State Normal School diplomas and State life diplomas.

The following exhibit shows the salaries paid to female teachers in San Francisco, according to the municipal report for 1886-87:

Principals of Grammar Schools, from \$100 to \$200 per month. Vice-Principals and inspecting teachers, from \$100 to \$175 per month.

Heads of departments in High Schools, \$155 per month; assistants, \$140 per month; teacher of music, \$50 per month; teacher of drawing, \$60 per month.

Principals of Primary Schools, from \$100 to \$150 per month.

Assistants in Grammar and Primary Schools, \$50 to \$80 per month.

Substitute teachers, who are only occasionally employed, get \$1 a day for reporting for duty. When employed, they receive \$3 per day; but for evening schools, only \$2 per evening.

(See Table D, "Wages and Hours of Labor of Females.")

TABLE D.

Wages and Hours of Labor of Females.

OCCUPATION.	Highest Wages Weekly	Lowest Wages Weekly	Average Wages Weekly	Monthly Wages.	Wages per Piece.	Hours of Labor Daily
Artificial flowers	\$7 00	\$3 00	\$5 00	-----	-----	8½
Awnings	7 00	3 00	6 00	-----	-----	10
Bagmakers	7 50	4 00	6 00	-----	20c per 100	10½
Baskets, fruit	5 00	3 00	5 00	-----	7c per 100	10
Bookbinding	10 00	5 00	8 00	-----	-----	9
Bookfolders	10 00	5 00	7 00	-----	5c a 100	9
Boots and shoes	12 00	5 00	7 50	-----	-----	9
Boxes, cigar	9 00	3 50	6 00	-----	70 to 95c 100	9
Boxes, paper	10 00	3 00	7 00	-----	50c to \$1 50 100	9½
Boxes, jewelry	6 00	4 00	6 00	-----	-----	9
Buttonhole makers, shoes	12 00	6 00	10 00	-----	-----	9
Brushes	9 00	6 00	7 00	-----	-----	9½
Bustles	9 00	5 00	7 00	-----	12½c per doz	9
Candymakers	10 00	3 50	6 00	-----	-----	10
Canmakers	8 00	5 00	6 00	-----	-----	10
Caps	9 00	4 50	7 50	-----	-----	9
Cartridges	6 00	6 00	6 00	-----	-----	9
Carpet sewers	9 00	5 00	9 00	-----	-----	9
Chair caners	9 00	3 00	6 00	-----	-----	10
Chocolate factory, packing	6 00	4 00	6 00	-----	-----	10
Cloaks	9 00	3 00	7 50	-----	-----	9
Coffee and spices	5 00	4 00	4 50	-----	-----	10
Collars and cuffs	8 00	5 00	7 00	-----	-----	9
Compositors	17 60	3 00	6 00	-----	25 to 40c 1,000	9
Confectionery	12 00	6 00	7 50	-----	-----	10
Copyists	12 00	6 00	9 00	-----	-----	-----
Cooks	-----	-----	-----	\$25 to \$40, board and lodging	-----	-----
Cigarmakers	8 00	3 00	6 00	-----	-----	9½
Cigar boxes	9 00	3 50	6 00	-----	-----	9
Cords and fringes	8 00	3 00	6 00	-----	-----	10
Corsets	9 00	5 00	7 50	-----	-----	10
Cotton mills	12 00	3 00	7 50	-----	-----	10½
Cracker factory, packing	12 50	3 00	7 50	-----	-----	10
Domestics	-----	-----	-----	\$15 to \$25, board and lodging	-----	-----
Dressmakers	9 00	3 00	5 00	-----	-----	9
Dress trimmings	7 00	4 00	5 00	-----	-----	9
Dyeing and scouring	9 00	7 00	8 00	-----	-----	9
Embroidery	9 00	6 00	7 50	-----	-----	9
Fancy boxes	6 00	4 00	5 00	-----	-----	10

TABLE D—Continued.

Occupation.	Highest Weekly Wages	Lowest Weekly Wages	Average Weekly Wages	Monthly Wages.	Wages per Piece.	Hours of Daily Labor
Feathers	\$5 00	\$5 00	\$5 00			9
Fringes and tassels	8 00	3 00	6 00			10
Fruit canning and packing	9 00	3 00	6 00			10
Furs	7 00	3 00	5 00			10
Gloves	12 00	5 00	7 50		\$1 to \$1 75 doz.	9
Hair dressers	15 00	5 00	10 00			9
Hair, human, workers	20 00	5 00	8 00			9
Harness braiders	10 00	3 00	7 50			9
Hosiery, factory	15 00	3 00	6 00			10
Hats and caps	9 00	4 50	7 50			9
Hatters, trimmers	18 00	6 00	10 00			9
Hoopskirts	8 00	4 00	7 00			9
Japanning	7 00	3 00	6 00			10
Jute mills	10 00	2 40	6 00			10½
Knitting, hosiery	9 00	3 00	6 00			10
Lace workers	7 00	4 00	5 50			9½
Laundry	12 00	7 00	8 00			11
Lithographers	7 00	4 00	6 00			8
Mantles and shawls	12 00	5 00	8 00			10
Mattresses	15 00	7 00	9 00		15 to 25c mat- tress (tick)	9½
Matches	8 00	4 00	6 00			9½
Millinery	9 00	3 00	6 00			9
Neckties	9 00	4 00	7 00			10
Overalls	7 50	2 50	5 00			10
Operators sewing machine	15 00	6 00	8 00			10
Paper boxes	10 00	3 00	7 00		50c to \$1 50 100.	9¼
Parasols	8 00	5 00	7 50			10
Printers, press feeders	7 00	4 00	7 00			8
Printers, job	12 00	3 00	7 00			9
Salt packers	6 00	6 00	6 00			10
Saleswomen	15 00	5 00	8 00			10
Shirtmakers	9 00	2 50	6 00		50c to \$2 50 doz.	9
Silk weavers	12 00	9 00	10 00			9
Silk spools	5 75	3 00	4 50			10
Soap packers	7 00	3 00	5 00			10
Straw workers, hats	9 00	3 00	6 00			10
Skirts	8 00	4 00	7 00			9
Suspenders	9 00	6 00	7 00			8
Tailoring	9 00	3 00	5 00			9½
Tacks and small nails	9 00	3 00	6 00			10
Teachers, public school				\$50 to \$125.		6
Teachers, private school				\$35 to \$75.		6
Teachers, music					50c to \$1 lesson.	9
Trunks	7 00	3 00	6 00			9½
Type foundry	9 00	9 00	9 00			10
Typewriters	20 00	5 00	10 00			9
Typesetters	17 00	3 00	6 00		25c to 40c 1,000.	9
Tin can makers	8 00	5 00	6 00			10
Tents	9 00	5 00	6 50			10
Underwear	8 50	4 50	6 00			9
Umbrellas	18 00	6 00	11 00			10
Upholsterers, draping	12 00	6 00	9 00			8
Valises	7 50	4 00	7 00			9½
Waiters	7 00	5 00	6 00			11
Weavers	12 00	7 50	9 00			10
Woolen mills	12 00	6 00	7 50			10
Winery, labelling and packing	4 00	4 00	4 00			10

CHAPTER IV.

TREATMENT OF WORKINGWOMEN.

Factory girls are not numerous in California, and as long as we have the Chinese with us it is well that it should be so, if both are to be employed in the same establishment. Managers of mills and factories are beginning to realize the fact that they must depend in the near future upon other help than the Chinese, and are trying to weed them out gradually. The avenues open to working girls in the principal cities and towns in the State have, therefore, so far been much restricted. Workingmen have unions, lodges, and benevolent associations, so that when out of work, or laid up by sickness, they are looked after and provided for. Workingwomen, on the contrary, have no such props, no such helping hands to fall back upon. With a large number of self-dependent girls it is "root, hog, or die." If defrauded, oppressed, or imposed upon, they have no one to protect or succor them, no influence around or behind to ward off and shield them from the grasping conscienceless employer living on the produce of their unrequited toil.

A lady interested in the work of the bureau, at my suggestion, dressed herself as a working girl and went to work for a firm that kept a standing advertisement in the newspaper for apprentices and for experienced hands. She applied for work as an expert in sewing, though not experienced in the coat-making or tailoring, in which line the firm was engaged. Here is the result of a little more than one week's experience:

I went to work for — January twenty-fourth; worked seven and one half days. Agreement was to serve one week as apprentice. He would not guarantee any set wages, but said he would give good wages. I received 50 cents for work done. At the end of the first week he said he would give about \$2, and after that would raise the amount 50 cents if I continued to improve. First week there were twelve girls all working on same condition—only two earning wages. One ran a machine and got \$3 50 a week. The other got \$2 50 a week. The rest received nothing. Worked from seven A. M. to six P. M., and had to work hard; one hour for lunch. He advertised in San Francisco papers to get new girls, as apprentices on coats, as operators, finishers, steady work and good pay. He would promise from \$6 to \$15 after girls knew their business. Would say they would learn the business in a month. Between twenty-five and thirty girls were taken in during my time, only two remaining over a week. His main object was to induce girls to come and work for him for nothing. When it came to the time for receiving wages, he offered them such small wages, they could not accept it. And when wages were due, instead of paying them promptly he told the girls that they would have to come around again, as he had no money about him. The business of cloak making was not taught there, as he only made the cheapest kind of slop article.

SWEATERS.

The class of men engaged in this kind of business are known as "sweaters," or middlemen. They supply wholesale clothiers, and some merchant tailors of the "Cheap John" class, with coats, pants, and vests, at so much per dozen. The prices paid for coats rate from \$9 to \$42 per dozen. The lowest in price are simply overalls.

As they are compelled to do cheap work in order to secure any, they naturally resort to the employment of cheap labor. Unfortunately, women who work at tailoring are unorganized, and they are therefore compelled to work for what they can get. These botch tailors take advantage of their employé's poverty, and force them to work at their own terms. They have no feeling for any one, but simply live to make money for themselves, no matter who suffers in the meantime. Any ordinary sewing girl should make at least \$1 a day, and some earn as much as \$2 50. To force them,

then, to work for \$2 a week, simply because they have an advantage over the girls, is inhuman.

DECOY ADVERTISEMENTS.

Advertisements appear daily in the newspapers, in which inducements are thrown out to young women and girls to learn trades. They state that the workers will be either paid while learning or will be paid after a week or two. Here are a few specimens, taken from the San Francisco newspapers:

A NEW CLASS IN THE EUROPEAN ART OF DRESSMAKING WILL COMMENCE January third; no scholars taken unless they can sew; can make your own dresses while learning; positions after learning.

OPERATORS, FINISHERS, AND APPRENTICES ON COATS; STEADY WORK; good pay.

GOOD SEWERS TO LEARN CORSET MAKING; WAGES PAID.

APPRENTICES WANTED ON CLOAKS; PAID WHILE LEARNING.

WANTED—GIRLS TO LEARN A TRADE; PAID WHILE LEARNING.

This offer to pay while learning is often a mere decoy. A dollar or two a week is promised at the start, with some proviso that the girl must be able to do so and so. It is generally found that she cannot do the thing provided to the satisfaction of her employer, and consequently she loses the miserable pittance promised.

THE SWEATING SYSTEM.

The paying while learning apprenticeship advertisement is often resorted to by the unprincipled sweater, who is only on the lookout for cheap labor. With this class the working girl is always an "apprentice," and her wages will remain at from \$1 to \$2 per week as long as the sweater can keep it at that figure.

The sweater is the middleman who contracts with the large manufacturers for quantities of work, and then gets it done by poor people at the lowest possible cost, making big profits without using any capital, skill, or labor of his own. The etymology of the word "sweater" is uncertain, but the name may possibly be derived from the old criminal offense of clipping or grinding some of the precious metal in the handling of gold coin, which is called "sweating." It would be well if the law could reach this despicable class who speculate on the poverty and helplessness of young girls. Some of the large firms protest that they know nothing about the sweating practices, but when they find competing sweaters contracting to do their work below living rates, surely they must suspect that the wretched creatures, who do the work for the sweaters are not fairly treated. The only way to reach the sweaters and put a stop to their nefarious method of doing business is by public exposure.

The "San Francisco Chronicle" did some good work in this direction by exposing a certain sweating coat-making concern in that city, in an article which appeared February 2, 1888. This was followed by an open investigation on the part of the bureau, at the rooms, 220 Sutter Street, February 7, 1888.

The following testimony, which was published in part at the time by the press of San Francisco, fully substantiates all that has been said about the treatment of girls by sweaters:

INVESTIGATION INTO THE TREATMENT OF GIRLS BY "SWEATERS" OR MIDDLEMEN.

SAN FRANCISCO, February 7, 1888.

MISS JENNIE MCABEE.

Called.

By COMMISSIONER TOBIN—How long have you worked in the factory? Answer—Until yesterday.

Q. For how long? A. About four weeks.

Q. When you looked for that situation was it in reply to an advertisement that you went there? A. It was. Yes, sir.

Q. Which of the two men did you see? A. Well, Mr. Breitstein was alone then. He was not in partnership with anybody.

Q. What arrangements did you make at the time? A. The arrangement at that time was simply that I went into the shop. I asked him what my wages were to be, and he said that would be according to what I did. That was not very satisfactory to me. I am not a beginner. I have to support myself. I can run a machine; and at the end of a week I asked him what I had coming to me. Then he told me that it was usual for the girls to work two or three weeks for nothing. "But," he said, "I will pay you \$2 50 a week for encouragement." And he said he would pay \$5 after the fourth week; and he asked me if I would work at what work came into the shop, and I said that I wanted to be an operator. And then asked him if he would give me \$6. His wife was there and we had a talk together. And then he found out that he could get no girls to take my place, and therefore he treated me individually well, or I would not have stayed another day for him.

Q. Did he pay you at the end of the first week? A. No, sir. He said it was not the custom to pay, but after a little he said if I would come back on Monday he would pay me Monday night.

Q. Did he give any advance for the second week? A. Yes, sir; \$3 50.

Q. And the next week after? A. He gave me \$3 the next week, instead of \$3 50. The fourth week he gave me \$4. I told him I could not support myself on that and could not work for that; his wife had promised me \$6, and he had agreed then to do it. And then he said if I would stay there for two months and work for \$6, he would raise my wages a dollar a month, until I got \$10 a week.

Q. Did he pay you at the end of the week? A. He did not pay on Saturday, and he told me to call again, and then he did not pay me. He said in the future he would pay on Saturday, after this came out in the papers. Then he paid the first week regularly. The next I do not know.

Q. Then he did not pay on the stated day? A. Well, he told me to come on Monday, but he did not pay. After he dissolved partnership, he said he would pay on Saturday, at four o'clock. The last week we did not work on Saturday; he gave me \$4.

Q. Had you any notion of coat-making before you went to him? A. I had not. He had an experienced hand staying by me. He said I was not worth the money. But I soon found that she did not work any faster than I could, nor better. There is not much to learn; if a girl knows anything about sewing, if she is any girl at all, she will know how to do it in a very short time.

Q. What kind of work was it? A. It was shop work on coats. He told me he got \$3 50 a dozen for them, and as far as custom coats are concerned, he did not make half a dozen of them since the time that I have been in there.

Q. Then the only way that you were instructed was by the hands that were there before? A. If I had depended upon them I would never have learned anything. They depended as much upon me. I was the only one in there that understood anything of it. He showed me something once, never twice; I am sure that he never laid his hand on my work twice. And as far as being a tailoress, a girl can work there for years and not be a tailoress. The work he has will not teach them to go into another shop. To turn and baste, and turn a coat and baste it around, and put on buttons after he marks it, and fell the sleeves in, that is the hand work that is to be done, and any woman can do that, and ought to be able to earn a dollar a day by that.

Q. A young woman that would learn the business there, would not be qualified to go into a merchant tailors? A. No, sir, she could not do it. There were hardly any in there that understood the work. The first girl was a good tailoress, and got \$9 a week, and he said he would give her \$10. She quit after the first week, and after that he has not had a tailoress in the shop, and has complained all the time that the girls there cannot do the work.

Q. How many girls were employed there while you were there, I mean on an average, what number? A. We had about ten or twelve. It is very hard to give an estimate, because a girl would come in the morning and another take her place in the afternoon. He had no regular girls.

Q. As far as your experience went, what would be the average time a girl would stay? A. Some would stay a week, and some, perhaps, two or three. One girl did, and he had to pay her. I think she was the only girl that ever worked for him and got anywhere near even.

Q. Is it a habit to keep constantly changing the girls? A. Yes, sir, ever since I have

been in the shop it is. I was very much surprised when he told me he would give me \$2 50 a week for encouragement. When a woman, who can run a machine, works from seven to six, she certainly must be said to earn her money when she demands a dollar a day.

Q. Were any of the goods destroyed in the shop? A. Not that I know of. There was some machine work. One or two of the girls had never run a machine before, and they did not work as nice as they might have done, but he never gave any of it back that I know of.

MISS MARGUERITE FORD.

Called.

Question—What is your name? Answer—Miss Ford.

Q. How long have you been at work? A. Three weeks next Saturday.

Q. What arrangements did you make? A. Well, I did not make any special arrangement about wages. He told me I should be paid from the beginning. I had been working at dressmaking for four years, and he told me as I knew how to make it, I should get wages right away. It would be all the way from \$10 to \$16. I worked all the week and all the time next week without asking for any wages, and then the following Monday after the week was out I asked him for the pay what I should receive. And then he said it was usual for his girls to work one or two weeks for nothing, and I told him that was not what he had told me when I spoke first with him. Had I known that I would not have come there. I have to make my living and could not live on what he offered me; that was \$2 50 the next week. And then I said I would have to leave him. Then he said he would pay \$2 50 for the first week, and then he said after the first week he would pay me \$3. That is to say, the first week was for nothing, and the second week he would pay \$2 50, and for the last \$3. He said he did better by me because I understood the work, and he could afford to give me better wages than the others.

Q. Did he hold out any inducement to you to stay? A. Oh, yes; after a couple of weeks he would make it all right; I would be able to make a dollar a day. I told him I would accept a dollar a day to start in with, and he said he could not afford to give it; when he got better kind of work, custom work, then he would pay it me.

Q. Were you taught any knowledge of the business by Mr. Breitstein when there? A. There was nothing to teach; I could sew all right.

Q. Then he did not teach you anything in the art of coat-making? A. No, sir; he did not teach me anything.

Q. If you had worked the third week in full what would you have received? A. \$3.

Q. Did you see any work destroyed by the girls? A. No, sir; there was nothing destroyed while I was there. If there was anything spoiled it cannot have amounted to much.

Q. How much custom work did you see done for the merchant tailors? A. Since I have been there, about four coats.

Q. The work generally done there was for the wholesale dealers; the cheapest kind of work? A. Yes, sir.

Q. Did he tell you that the money he paid you was not for wages, only for spending money? A. No, sir; he did not. He said he would like to give me more. He said he thought that I was worth more, but he could not afford it at present, until he could get some more custom work.

Q. What did he say he received for the work? A. He said he received about six bits a coat.

Q. Did Mr. Breitstein ask you to sign a paper to the effect that you were satisfied with the admirable manner in which he conducted his establishment? A. Yes, sir.

Q. Did you sign it? A. No, sir.

Q. On what grounds? A. I said if I signed it I would not have told the truth; I was not satisfied with the wages. He tried his best to make me sign it yesterday—both he and his wife. He said if he had a girl and she would not sign it he would discharge her; and then I told him he could discharge me, for I was not going to sign it.

Q. Do you know how many girls received \$12? A. He has none.

Q. Do you know of two girls paid \$5 a week? A. No, sir.

Q. Do you know of any girl in his employ who has been in there for more than a month? A. No, sir; I am there longer than anybody else at present.

Q. You came there in answer to his advertisement? A. Yes, sir.

MISS LULU DONAGAN.

Called.

Question—How long were you at Mr. Breitstein's? Answer—A week and a day.

Q. Did you go to him in reply to his advertisement? A. Yes.

Q. When you went to Mr. Breitstein what agreement did you make? A. He said I should work for the first week for nothing and then he told me to come on Saturday and sign my name, and next week he would pay me \$2, and next week \$2 50; he would first want to know me. And this morning he told me he had changed his mind, and would only pay me four bits. That was after I had signed for a week.

Q. Was what you signed a contract? A. Yes, sir. I told him I was satisfied to work for \$2 a week, and this morning he told me he would only give me 50 cents a week.

Q. Was it because he was displeased with the work? A. I do not know. The work was all right.

Q. Did he make use to you of the expression that this money was for spending money?
A. No, sir; he did not say anything about spending money.

Q. Did you accept his generous offer? A. No, sir; I said I was satisfied to work for \$2 a week, but not for 50 cents.

MISS McABEE.

Recalled.

Question—How many pressermen have been employed there since you were there, Miss McAbee? Answer—I could not tell the number. The pressermen have come and gone just like the girls. And if he treated them like that, I do not think they were wrong.

MISS MOLLIE VIZZARD.

Called.

Question—How long have you worked there? Answer—For two months. I started to work for him in August and quit in October.

Q. Commencing what day? A. The eighth of August.

Q. Was it in reply to his advertisement? A. Yes, sir.

Q. Did you go in as apprentice, or as an experienced hand? A. As apprentice. I never worked a day before.

Q. And what arrangement did you make with Mr. Breitstein? A. I went there in reply to his call on a Saturday night, and he told me to come Monday morning. He said for me to work a couple of weeks for nothing, after I had told him that I was not an experienced hand. The second week I asked him what he was going to pay me. He started to say that I had promised to come here to work for two weeks for nothing. I said to him I wouldn't work any more for nothing, and he said he would see. Well, I said, I don't work for nothing. All right, he said, I will give you enough for your board. The third week again I asked him for pay, and he told me to wait. Then he gave me a dollar, and I said that was very encouraging [laughing]. He said it was for candy.

Q. What did he give you at the end of the fourth week? A. One dollar and a half. I asked him if he thought he could live on \$1 50; I could not. He said, well, he thought that ought to be enough for any girl apprentice. I told him I knew that I could sew all right, and why should I not get more if I was worth it? Then he gave me first \$2, and the next week \$3, and when I got out of the employ he told me he would pay me up, and to come to his house; but I got tired of running there.

Q. Did he promptly pay his debts? A. He did not. Sometimes he said he did not get pay for his own work, and he could not pay us, and then I would get paid for two weeks.

Q. Did he employ more than ten or twelve girls there during the time you were there? Taking all those he brought in, were there more than ten or twelve? A. I think so. Sometimes a girl would come in the morning and leave in the afternoon, and others would stay there only two days or so.

Q. Did any of the girls who worked two or three days of the week receive any money for candy that you are aware of? A. Only one girl. I think he gave her four bits. One girl worked there for six months; very nearly six months. That is what she told me.

Q. What work were you at? A. I was hand-sewing; basting, you might say.

Q. You were there for two months; did you get \$3 for the other time? A. No, sir; \$2 was the highest I ever received.

Q. What class of work did you see? A. Shopwork and some custom work.

Q. How much of it was custom work? A. I do not know any of the merchant tailors. But on the custom work he had no tags on the coats. For a merchant tailor he had the other labels.

Q. You would know the difference for the wholesale dealers? A. Yes, sir.

Q. Did you see many coats for the merchant tailors? A. No, sir; very few.

Q. Did you see any coats destroyed by the girls? A. No, sir; but I have seen some of them destroyed by himself by the bad cutting of them.

Q. But none by the sewing of the girls? A. No, sir; because he had a watch over the girls and they couldn't destroy anything.

Q. Did you ever see him tear the coats open again on account of the bad work? A. No, sir; none except the wadding of a sleeve, and that was in consequence of bad machine sewing, and also the bad cutting. Fifty-seven coats came back one day; that was on account of the back lining. It was on a Saturday. He had the lining made smaller, and a piece put in the shoulder, and made them up again; that was on account of the bad cutting.

MISS ANNIE MCGUIRK.

Called.

Question—How long have you worked there? Answer—I worked there for five weeks.

Q. Was it in answer to his advertisement that you went there also? A. Yes, sir.

Q. What arrangement did you enter into? A. My mother went with me. He said in two or three days he would tell me how much I was worth. On Saturday night he told me I had to serve for three weeks, and I served four weeks without pay.

Q. Did he give you any money for candy or car fare? A. Yes, sir; he gave me four bits.

Q. What for? A. For spending money.

Q. That was at the end of the fourth week? A. Yes, sir; and after the fifth week he gave me four bits, too.

Q. Did you say anything to him about wages? A. When this young lady asked for

her's, then I asked, too. When I went back Monday morning, he said he had no further use for me.

Q. Did you do any work there for the money? A. I think I did; I did a great deal of work; all the felling of sleeves, lining, and basting, and filling in pieces, too.

Q. Now, could you tell me at how many cents a week you did that work, or in a day? A. I do not know. I can say that one day I felled over seven or eight sleeve linings, and had to work very quick for it; that was for half a day.

Q. That would be at the rate of sixteen for a day? A. Yes, sir.

Q. What wages did you receive at the end of the fifth week? A. The same—four bits.

Q. Then, altogether, you got a dollar? A. Yes, sir.

Q. Did he hold out any inducement for you to remain? A. No, he did not give me a chance. He told me he had no further use for me.

Q. Was it hand-sewing you did, or did you work on the machine at all? A. About half the day on both; I felled some sleeve linings, that was all. When I was there for the second week, I was told that he had fooled other girls that way.

Q. Did any one show you how to do the work? A. All I had to do was to look at the other girls round me.

Q. Did Mr. Briestein show you? A. No, sir; he never put a needle on the work in my hand.

Q. Did you have to run messages for them, or other errands? A. I went twice to the machine shop, and on some four errands since I was there.

Q. Had you to do any outside work—to sweep the floor, or such? A. One day he told me to do that, and I told him I did not come there for that.

Q. Did any of the hands show you how to work on the machine? A. No, sir; and he never showed me anything.

MISS PRISCILLA COHEN.

Called.

Question—How long have you worked there? Answer—About one week and a day.

Q. Was it in answer to his advertisement that you went there? A. Yes, sir.

Q. What arrangement did you make? A. That I should receive \$3 for the first week. My sister went with me.

Q. Did you go there as an apprentice? A. No, sir. I could baste on a coat.

Q. You had some experience? A. Yes, sir. I had worked for four or five months.

Q. Did you ever work for him before? A. No, sir; but long before that I knew what he was; that is, I knew of him, but when I went there I did not know that that was the man. After I had worked four days, and found out who it was, I did not want to work there any more. He said that I had better come up again, and he would pay me \$4, and he told me to sign my name in a book, and I did it.

Q. Did you read the paper? A. No, sir; he just handed it to me, and said, "Here, sign your name."

Q. Did he tell you why he wanted you to sign? A. No, sir; he gave me my money first, and then just told me to sign my name.

Q. Did he read what it was in this book? A. No, sir.

Q. Your name was the first? A. Yes, sir. Then after I had signed it he told me I needn't come on Monday any more. I came this morning, and he said, "Just sit down and do the work." And he said, "I will pay her four bits a week, and I will pay you \$2 50." That was after he promised to give me \$3.

The several young women declared that the experience they had had with Mr. Breitstein was not different from what others had at other places. There seemed to be plenty of girls to take situations. It was difficult to get a place, even if work was offered for nothing or very little for the first weeks. The average wages were between \$4 and \$3 a week; \$6 would be considered as very good for a woman in San Francisco. One of the girls said that she received at present \$7 50 per week, but that was at a place in the Mission, and that in the city wages would range at about \$4 or \$5. Another remarked that the work which she could get barely assisted her to subsist. When she wanted to get some new clothes she had to go out as chambermaid. The reason that she did not do this all the time, was that the position was not so independent. Everybody seemed to jeer at a servant girl. Then the treatment, in most of the houses, was so unkind that it was hard to stand it. A girl who had a little education—sometimes more than those in the house—was not allowed to see any friends in the house. She could often not invite any lady friend to her room, and as for seeing a gentleman friend or receiving a caller, that was quite out of the question. Then, many families insisted upon the girl washing windows, and that she would absolutely refuse to do. Any other work she was perfectly willing

to do. The best position was in the larger hotels. There the work was pretty hard, but they had most of their Sunday free, and shorter hours. The positions got through the employment offices were often of the worst kind, and she had heard from many of her friends who had gone to such, that they could not stand it more than a day. Yet when they went there they had done so with the best wish to please all, and with the desire to keep the situation, because they needed it.

DECOY ADVERTISEMENTS.

Advertisements from telegraph schools, or "colleges," as they are called, offering high salaries, can be seen almost daily. Here are some specimens:

WANTED—THREE MORE YOUNG LADIES TO LEARN TELEGRAPHING ON our lines and take paying situations; \$70, \$80, \$90, \$100, \$110, \$120, \$125, monthly.

WANTED—BEFORE MARCH TWENTY-FOURTH, FOUR MORE YOUNG ladies to learn telegraphing on our lines to take paying situations; \$70 to \$125, monthly.

WANTED—FOR CITY OFFICES, SEVEN YOUNG LADIES TO LEARN TELEGRAPHING on our lines and take paying situations; \$70, \$80, \$90, \$100, \$110, \$120, \$125, monthly.

The advertisements are cunningly devised; one day, *three* young ladies are wanted; another day, *four*; and another, *seven*; and they are made to appear as if coming from the superintendent or manager of a telegraph company, and not from a principal of a school. All three advertisements are from a telegraph school in San Francisco.

Such lying advertisements, holding alluring prospects of large salaries, entrap many unsophisticated young persons, who contrive by hook or crook to raise the necessary deposit of \$50 or \$60 required in advance for tuition. When the three or four months' education are about expired and a passable knowledge of telegraphy is acquired, the pupil sees vanishing before her vision the \$70 to \$125 monthly position promised, and the grim reality of \$1 to \$1 50 per day materializing in its stead. Many of these institutions have been exposed in Eastern States, and it is about time that this system of "plug" teaching, as it is called, should receive its quietus in California. Superintendent Frank Jaynes, of the Western Union Telegraph Company, said that young women from remote sections of the Pacific Coast are induced by these decoy advertisements to leave their homes and come to San Francisco, only to find too late that they have been deceived and entrapped. Mayor Hewitt, of New York, in order to put a stop to this nefarious business, and, finding the law inoperative, stationed police officers in front of the telegraph institutions and warned applicants of what they might expect if they entered.

The salaries of young women employed by the Western Union in this State range from \$50 to \$75 per month, and average \$60. As there are only about one hundred and twenty female operators employed by the Western Union in California, it can be seen how small must be the number of vacancies likely to occur, and how false the advertisement for young ladies to fill vacancies of from three to seven places every month.

CHAPTER V.

DOMESTICS—WHY GIRLS WILL NOT BECOME SERVANTS.

When the small wages paid to girls in most vocations are considered, many persons express astonishment that they do not hire out as domestics, so that they can have good homes and good wages.

Day after day in the columns of our daily newspapers the question is asked by lady correspondents, "Why don't the girls enter domestic service?" There is a great demand for servant girls in California, and nowhere in the world are they paid such good wages. It is a fact, patent to all observers, that American girls will enter into domestic service only as a last resort. Fortunately, or unfortunately, as the case may be, the bulk of our girls, somehow, cultivate the notion that such service is menial, and not as respectable as running a sewing machine, or factory loom, or to be a shop girl. You cannot convince them that standing behind a counter for twelve or fourteen hours a day for a miserable stipend, is not as healthy and profitable, and conducive to future welfare, as acting in the capacity of a well paid, well fed, parlor or chamber maid.

It is the badge of servitude they revolt against. The fact of being a servant girl, even though sugar coated with the name of "help," is repugnant to them because what is termed society taboos servants. A saleswoman, or "saleslady," as she is politely termed, is socially recognized except among the "bon ton." Seamstresses, milliners, and factory girls are tolerated, but the ordinary servant girl is below where the line is drawn by "genteel" society.

A man of standing and considerable means may marry a female occupying any position above this line without offending high toned relatives and friends, but if he should marry a kitchen or chamber maid, cook, or waiter girl, no matter how graceful, beautiful, or talented, they would be dreadfully shocked. Such a wife would often have to bear the thinly veiled scorn or disdain of her own sex, when venturing among the circles through which her husband moved. As ninety-nine out of every one hundred young girls expect to marry and get a good match, they are naturally averse to engaging in any occupation having a "bar sinister" upon it.

Another reason why our girls do not like domestic service is because they are sometimes subjected to ill treatment, and overbearing, or tyrannous, conduct on the part of the lady of the house. This, I believe to be the exception, and not the rule, in California. From all that I can learn, in the majority of instances, girls in domestic service, especially in the country, and in our small cities and towns, are treated like members of the family. Of course there are in this State, as elsewhere, mistresses who are hard to get along with; who are overbearing and unreasonable; who are easily chafed by blunders or neglect, and who are intolerant of trivial faults. They are generally the upstarts, who, graduating from the cellar or the garret, by freak of fortune, stumbled into comfort or affluence.

Still another objection girls have to domestic service, is the long confinement to the house where she is employed, and subject to the almost interminable bid or beck of every member of the family. A seamstress, or factory girl, hard though her work is while it lasts, is a free girl to go or do as she pleases when her day's work is done. She can go to ball, or party, or theater, without asking leave. She can meet her sweetheart where she pleases, instead of having him stealthily smuggled in by the cellar or back door, as the domestics often have to do.

The American girl feels like the orator of the Revolution when he cried out, "Give me liberty, or give me death!" In spite of these objections, and taking it all for all, about the most comfortably situated working girl is the domestic in a family of decent, humane, well bred people. She is well lodged and well fed, and in sickness is generally kindly cared for. She is of the class of female wage earners who can be seen, month after month, entering, with bank book in hand or pocket, the door of the savings bank to deposit her little earnings. As a class, there are none healthier

and stronger than the servant girls, for, although they have to work hard, they get good food, wear comfortable clothes, and have decent and clean sleeping apartments in dwellings generally favorably located. The same scarcity of suitable help is said to exist in the East, and this probably accounts for the fact that very few servant girls are now coming to California from that direction.

WAGES OF DOMESTICS.

For general housework from \$12 to \$25 a month is paid, according to the amount and character of the work done. When the family washing is done by the girl together with the other work of the house, she usually receives from \$20 to \$25 a month, according to the size of the family. Many families in these days do not have much use for servants. They send their washing out and eat their meals at restaurants, and they only need girls to care for younger children and other trivial services. For this work many girls are desired that are from twelve to sixteen years of age, and the wages paid are from \$8 to \$12 a month. Employment offices have much difficulty to supply this demand. Of course the wages paid to female cooks are much higher than that paid for ordinary housework. From \$25 to \$35 a month is usually paid, and even as high as \$50 a month by wealthy families for first-class female cooks. The chance for a girl to get a good situation is also often owing to the kind of cooking she has been taught. Many families are very fastidious in their demands for a cook, and they are often dissatisfied for almost unaccountable reasons. Girls are sometimes justly blamed for not being willing to work, but they are also too often imposed upon by false representations as to the amount of work to be done, and are thus for little wages asked to do all the work for a large family. This fact, together with the tyrannical, overbearing disposition of the mistress, makes it almost impossible for many women to keep girls in their employ. For week after week these employers haunt the employment offices, trying one after another, till at last they find that no self-respecting girl will stay with them, and then they fall back on the stolid Chinaman to do their work.

It will thus be seen that notwithstanding the large demand for girls, it is not always easy for a girl to find a situation that is suitable to her capabilities. Out of a hundred situations open to her there may not be one that she can fill, and this fact often leads to much disappointment when a girl comes to find work. On this account the employment offices are constantly thronged with women, who, notwithstanding the numerous applications, are unsuccessful in obtaining satisfactory situations.

SCARCITY OF DOMESTICS.

Another difficulty complained of by employment office men is that there is an especial scarcity of young and strong girls who wish to take positions as house servants. Most families want women at least between the ages of twenty and thirty, but the majority of applicants are over that age, and many of them are quite old and feeble and not capable of doing any kind of work. It is almost impossible to get situations for the latter class, but many of them sit around the employment office from day to day, their persistency and eagerness to obtain some kind of work being quite pathetic.

On the other hand it is said to be remarkable how many strong girls, who have reached the age of eighteen and twenty years, are incapable of performing ordinary household work on account of want of knowledge and

experience. This is the case especially where there are large families of girls, when one or two do all the work while the rest go to school.

There is more complaint of inefficiency in household service than in almost any other department of labor. Merchants, manufacturers, storekeepers, builders, and contractors, can generally find all the skilled help they require, but heads of families are sometimes put to much trouble and inconvenience for want of efficient domestics. An English lady, Mrs. Elizabeth Parker, discovered this fact about a year ago, and conceived the idea of supplying the want by the importation of help from England. The experiment, like others of the kind, proved a failure. Instead of taking girls from the kitchen and the laundry, she brought over a higher grade, who expected to assume the role of housekeepers and "boss" other servants. As American housewives generally do that line of business themselves, and did not want to be relieved of the responsibility, these English girls found themselves without work or money, and the British Consul had to come to their rescue and return them to their homes.

Efforts are being made, with considerable success, in some institutions, to instruct young girls in the art of cooking, such as in the cookery school at the Silver Street Kindergarten, and the Young Women's Christian Association, in San Francisco; in the Deaf, Dumb, and Blind Asylum, in Berkeley, and in some of our orphan asylums. They can, however, only train a small percentage of the number required, and a more available, extensive, and well organized system of training girls in the culinary art is demanded; such as that now in operation in the Girls' Normal School of Philadelphia.

The principal of a long established employment agency informed me that while there is a great dearth in the labor market for domestics between the ages of eighteen and thirty-five years, there is a glut of girls in the clerical and shop assistant line. "In fact," said he, "instead of three girls looking after one mistress, there are three ladies looking after the one girl." The result is, that wages are high, and a good domestic is looked upon as a treasure who should not be lightly got rid of. From the difficulty sometimes experienced in suiting the girl applying at the office for a situation, you would think it was the girl who was hiring the lady, instead of the lady the girl. "On the other hand," said he, "if I should insert an advertisement in the paper for girls to fill some clerical position, hundreds would apply for it. The result is that wages are low for them. A certain large firm (whose name he gave me) employed quite a number of shop girls at from \$3 to \$4 a week, and many of them were highly educated—graduates of grammar and high schools," etc.

CHAPTER VI.

PROTECTIVE AND BENEVOLENT INSTITUTIONS FOR WOMEN AND GIRLS.

In several eastern cities there are Workingwomen's Protective Unions, or Associations, whose object it is to discover and stamp out heartless swindlers who live off the sweat of the poor working girl. These associations receive complaints from workingwomen, and attend to their wants as far as possible. They investigate every complaint that comes before them; and in cases of withheld pay they try to collect the bill. If necessary, they sue for the claim, and, if collected, pay it over without any charge. No fees of any kind are charged.

NEW YORK WORKINGWOMEN'S PROTECTIVE UNION.

In New York the Workingwomen's Protective Union has accomplished a world of good. It was established during the war, for the employment and protection of sewing and tradeswomen, and in other callings in which women are employed, except household service. Domestics are excluded because the woman who lives at service has her home where she is employed, and her board, while the poor girl who works out by the day or week is often deprived of her shelter and turned into the street, when her wages are withheld. The Union does not shelter, nor does it give charity. The officers of the Union are a President, Vice-President, Secretary, Treasurer, and twelve Directors. All of these constitute a Board of Management, and five make a quorum for the transaction of business. The officers and Directors are elected annually by the members. The payment of \$10 entitles a person to membership for one year, and \$50 for life membership. In the twenty-third annual report of this Society—1886—it is stated that the Union had answered two hundred and ninety thousand four hundred and fifteen applications since the date of its organization; has furnished forty-eight thousand one hundred and seven employments; has prosecuted ten thousand one hundred and twenty-three complaints of fraud; has recovered and paid over to workingwomen \$35,372 57, in sums averaging only \$3 49, free of all costs to complainants. In answer to a letter of inquiry from this office, the Superintendent of this Union, Mrs. M. W. Ferrer, said:

When our Union was established over twenty years ago, it was intended to let the women manage it for themselves. They soon found out that the women themselves were unable to organize properly, or to manage its affairs. A number of influential gentlemen concluded to assume the management. A Bureau of Employment was established; also a Bureau of Information and Advice. In connection with the latter there is a lawyer, who volunteers his services and visits the rooms every Wednesday, when such cases, as we are not able to collect, are placed before him and are sued according to his directions in the matter. The Board of Directors are all gentlemen, but the Superintendent and two assistants are ladies. A poor working girl who is defrauded of her wages cannot set the machinery of the law in motion. The money due is too small to tempt a lawyer if he got the whole of it, and the Court would scarcely recognize or hear her.

WANT OF A PROTECTIVE UNION IN SAN FRANCISCO.

If we had a society in San Francisco like the New York Workingwomen's Protective Union, she could go to it with her complaint, and instantly the case would be put into the hands of the Union's lawyer. The machinery of justice would be put on its wheels. An officer of the Union armed with justice would go into the store or workshop of the defrauder and say: "That girl's pay, or go to Court;" and if he would not pay he would have to go, and, when he left, it would be either to jail or else minus the amount claimed, with costs of Court, and the admonition of the indignant Judge ringing in his ears. Many a poor girl to whom wages are due is put off by heartless employers, many of them of her own sex, by promises of payment "next week;" "next month;" but such a society brushes aside all *subordinates* and throtles the *principal*, saying, "We must have it settled now."

Immediately following the exposure of the sweating method of doing business in San Francisco, I strongly advocated through the press the formation of a Workingwomen's Protective Union in San Francisco. The newspapers of San Francisco cordially supported the movement, and the Ladies' Assembly, No. 5,855, of the Knights of Labor, took the matter in hand. As will be seen from the organization of the New York Association, it will probably be found necessary for the success of the Protective Union here

that some gentlemen of means and influence should take a hand in the enterprise. The ladies should act as the officers of the Union—receive complaints, record and investigate them, keep the accounts, and be the immediate active workers and dispensers. Behind them should be the gentlemen to direct, counsel, advise, and provide the means to keep the machinery in motion.

CHARITABLE AND BENEVOLENT ASSOCIATIONS.

In San Francisco there are several female charitable or benevolent institutions which are under the care and discretion of zealous, philanthropic ladies. They do a great deal of good in their way, but they do not reach the actual workingwoman in her hour of misery and helplessness; or, if so, can alleviate, only in a very slight degree, the masses that should be attended to. Workingmen have their friendly and benevolent organizations in large numbers, through which relief of every kind is assured them in sickness and in enforced idleness. Very few mechanics but belong to some one or more of these associations, which are daily increasing. Not so with the workingwomen. Into some of these benevolent associations women are admitted; in a few they have separate lodges for females. But the number of women in these societies is very small indeed compared to the number who are eligible and do not belong to them. Consequently, we have pressing need for organizations to lend a helping hand to the workingwoman who is in need of assistance.

The "SAN FRANCISCO GIRLS UNION," located at 714 Bush Street, in that city, was formed primarily for the interests of the self-reliant, self-respecting girls of the coast, and unprotected strangers. Its object is to give every beneficiary member, whatever in the line of her honest endeavor the protection and friendly interest in her case requires, and to furnish the patrons of skilled and domestic industries, in the way of supply, with the best self-supporting classes of females. This institution accommodates from twenty to thirty girls, and the management are making great exertions to enlarge the home and extend its usefulness.

A "HOME AND NIGHT REFUGE FOR GIRLS" has been lately established by some benevolent ladies at 218 Grove Street, San Francisco. The lady superintendent sets forth the objects of this institution as follows:

There are so many strange girls always coming to a large city (and oftentimes girls who are living here) who find themselves without home or money through no fault of their own. Before we opened our place here in this Home, there was nowhere to take them but to the City Prison. Many bad places were always open to them and they were subjected to the worst temptations. Now they come to us. Our primary object is to provide those who are completely destitute with a shelter. The Home is very small, as it is only a beginning, and can accommodate only about half a dozen girls.

The "BOYS AND GIRLS AID SOCIETY" rescues homeless, neglected, or abused children, and provides for such until suitable homes or employment and oversight are found for them, and continues a systematic attention to their condition and treatment. A free employment bureau for boys and girls is maintained; also a day and evening school; department for industrial training for both sexes; classes in singing; reading rooms and library. Lodging and board, at a nominal charge, furnished working boys and girls without suitable homes or care in the city. The Home is beautifully situated (nearly opposite main entrance of Golden Gate Park), and in arrangement, means of classification of children, light, ventilation, and drainage, is as perfectly adapted to this work as any building in the United States.

The "WOMEN'S EXCHANGE," of San Francisco, was established about

three years ago, for the benefit and relief of needy women, especially of the class who have been reduced in circumstances through the vicissitudes of fortune. The ladies conducting the Exchange have rented a large store at 116 Sutter Street, where are exhibited for sale an extensive and varied assortment of articles made by the hands of industrious, respectable women in need of assistance. An excellent lunch is dispensed at the same place, and is largely patronized. The third annual report of the Exchange shows that there was paid to the exhibitors for articles sold \$15,909 35; and the receipts for lunch amounted to \$8,619 90. The charitable work of the Women's Exchange is designed to reach that most deserving class, who are "too proud to beg, too honest to steal;" and that it is doing so is evidenced by its progress.

Besides these there are charitable associations, attached to many of the churches, composed of ladies who devote much of their time to alleviating the wants, both temporal and spiritual, of their own sex, such as the "Young Women's Christian Association," the "St. Vincent De Paul Ladies' Society," etc.

The MAGDALEN ASYLUM, of San Francisco, was established in 1856 for the reformation of fallen women. It is under the charge of the Sisters of Mercy, and is admirably managed. In 1869, the female department of the San Francisco Industrial School was disbanded by the city authorities and, from that date, girls of the vagrant, or criminally disposed, class have been consigned to this asylum by the Courts. For these girls the city pays \$15 each per month while under age. The total number, according to the last report, in the asylum, of women and girls, is one hundred and seventy-eight, and the number of these paid for by the city is forty-three, leaving one hundred and thirty-five to be supported by private and charitable means. All kinds of needlework, embroidery, etc., is done at the asylum, but the inmates do not get work enough to make the institution self-supporting. The San Francisco Auditor's report for 1887 shows that \$9,217 were paid to the asylum for the support of girls committed during that year. The girls who have been sent to the asylum by the Judges of criminal Courts are kept entirely apart from the regular inmates, who are known as magdalens, or "penitents." No intercourse whatever is allowed between the two classes, who occupy separate wings of the building, the Sisters in charge occupying the center portion of the building. The Sisters watch unceasingly over their care. Even at night there is a Sister close to each dormitory door, who can see at a glance if anything goes wrong. Gentle, kind, considerate treatment of the unfortunates by the Sisters, whose every day life is to them a living example, has the effect of restoring to a virtuous life the majority of them. Little by little the Sisters entice them to lead regular lives and to follow Christian maxims. At first they are induced to live according to rule a certain number of days, then of months, until finally they are strong enough in virtue to promise to live in this way for one, two, or more years. There are several who prefer to spend the remainder of their lives in the asylum, rather than face the dangers and temptations which had previously conquered them. The Sisters recommend those who leave the asylum and marry to acquaint their husbands before their marriage with the fact that they have been inmates of the asylum.

Besides the foregoing, there are institutions for the aged and infirm, infants' shelters, and hospitals, and asylums for the different infirmities or "ills that flesh is heir to."

CHAPTER VII.

PHYSICAL AND SOCIAL CONDITIONS—HEALTH OF WORKINGWOMEN.

As far as health conditions are concerned, the working women and girls of California are better off than those in most of the States of the Union. It is almost certain that there can be found a larger proportion of active, strong, healthy looking girls in the workshops, factories, and stores of San Francisco, than in any other large city. Visitors from abroad and from other cities of the United States are quickly impressed by the robust shape and healthy bloom of the female portion of the community, and it is said that California is developing the finest physical specimens of women in the world. Nature, and not man, is entitled to credit for this happy condition, which, however, is not an unmixed blessing. The genial climate of California often reconciles female wage earners to surroundings otherwise unendurable. In the great majority of cases the factories and workshops, where females are employed, are well lit and ventilated, and due regard is paid to the health and comfort of the employés. Especially is this the case when they are situated outside the limits of thickly populated thoroughfares, and in suburban cities like Oakland and San José.

IN THE WORKSHOPS.

It is in the down town portion of San Francisco, east of Dupont Street, that workshops can be found where these conditions are reversed. Here, in the tobacco and boot and shoe factories where Chinese are employed, but little attention is paid to the demands of cleanliness and health. Here can be observed dark, dingy, dirty passages, badly lit and badly ventilated workrooms, impregnated with that indescribable odor which permeates every place wherein the Chinaman has his being; water-closets horribly filthy; windows never cleaned, with broken panes patched up with rags or boards; nauseating smell of Chinese cookery, for the Chinaman generally boards on the premises where he works. In some of these places, where white girls are employed, Chinamen are the ostensible proprietors. Some of the printing houses are in the vicinity of fish and vegetable markets, and the prevailing odors are both disagreeable and prejudicial to the health of the female compositors employed therein. Several of them testified before me that they were obliged to give up their situations on this account. In one Chinese boot and shoe factory, situated on Clay Street, visited by me, I found three white girls who expressed themselves as perfectly content with their lot, although the proprietor and foremen were Chinese, as were all the others employed. Their looks, however, somewhat belied their words, for they held down their heads and evidently did not like to be seen in such a place.

IN THE CELLARS AND BASEMENTS.

Besides the places referred to there are workshops in the basements, under the sidewalks, on some of the principal streets of San Francisco, which are totally unfit, and were never intended, for the purpose. The proprietors of some of the large establishments use these places on the plea of lack of room, convenience, or to save a few dollars in rent. It is inconceivable that they would be so blind to the dictates of humanity as to put their working women and girls in such places where the light of day can only enter through gratings or skylights in the sidewalk, where there

is no ventilation worthy of the name, and where everything has a look of coldness and dampness. One of these places situated on Kearny Street, which I visited, was thus truthfully described at the time:

An underground workshop for women; which, from a hygienic point of view, must in time prove disastrous to the constitution of any one compelled to spend the entire day therein. It is a basement room, located partly under the sidewalk, and is dark, damp, and cold. Between the whitewashed walls of perspiring masonry, working with feeble energy, are eighteen girls, some at machines, and others at chair and table. The place practically has no ventilation; in the sidewalk above are glass gratings, which serve poorly as skylights. As can be imagined, the light from this source is inadequate, and to supply the deficiency several gas jets are kept constantly burning. The never changing atmosphere is fetid and chilly, and rendered still more unwholesome by the uprisings of sewer gas, the nauseous odor of which is plainly distinguishable. Added to this, in warm weather, are rank odors and gases, the presence of which characterize all underground places, whether used or not. In fact, there is no chance of improving the conditions of the place. It is a hole in the ground, pure and simple, and the unfortunate occupants only vegetate there, and suffer uncomplainingly. "We are satisfied with our pay," said one girl, "but not with our workshop. As you see for yourself, it is not a fit place for human beings to work in, day after day. It is unhealthy, and wears us out. We make cloaks here, and earn from \$6 to \$10 per week, working from 8 A. M. to 5:30 P. M., daily. Some of us have worked here a long time, because we are doing as well as girls in other places, and could not afford to make a change. We have no complaints to make against our treatment, but it looks cruel to keep us in such a miserable place as this. Our toilet facilities are poor, only one water-closet being in use between both sexes. The smell arising from this source, and the odors of sewer gas, render our existence here horrible. A change to other quarters would be a Godsend to some of us, but how are we going to bring this about? No, my health is not good; but I cannot afford to complain, and perhaps lose my place."

By paying from \$40 to \$50 per month, the proprietors of the places so described could rent dwelling houses on Mission or Howard Streets, within a few blocks of their stores, which would make light, airy, well ventilated workshops. We want a law upon our statute books prohibiting the employment of persons in workshops of the character herein described. If we had a "Workshop and Factory Inspector," as they have in some Eastern States, armed with the power of such a law, these parsimonious and unfeeling proprietors could be reached, and women would not have to work in places sacred only to animals of the rodent species.

IN THE FACTORIES.

In the jute factories in East Oakland, when jute bags are in process of manufacture, the air is so filled with floating filaments that it is both blinding and stifling, and must be very unhealthy.

In a silk dyeing establishment, where girls are employed, the fumes are said to be poisonous, and the girls have to work daily for hours over the vats where they must inhale these fumes.

In tobacco factories women often contract disease brought about by the noxious smell, dust, and nicotine. By reference to the tabulated statements it will be seen that many female cigarmakers complain of bad ventilation, bad sewerage, offensive odors, and want of proper facilities for washing and changing clothes. In a great many cases separate water-closets are not provided for the sexes, and no attention is paid to keeping them in a clean condition. This has grown to be a widespread evil and should not be tolerated, especially where Chinese work in the same room with American girls. A modest young girl will endure, frequently, untold agony, rather than run the gauntlet of prying male eyes on the way to the water-closet, and many on this account have laid the foundation of permanent disease. In this direction, also, there would be found salutary work for a Workshop and Factory Inspector.

THE LAWS IN MASSACHUSETTS.

To correct and prevent the evils referred to, the Legislature of Massachusetts passed the following laws which are now in force:

AN ACT TO SECURE PROPER SANITARY PROVISIONS IN FACTORIES AND WORKSHOPS.

SECTION 1. Every person employing five or more persons in a factory, or employing children, young persons, or women, five or more in number, in a workshop, shall keep such factory or workshop in a cleanly state and free from effluvia arising from any drain, privy, or other nuisance.

SEC. 2. Every person employing five or more persons in a factory, or employing children, young people, or women, five or more in number, in a workshop, shall provide, within reasonable access, a sufficient number of proper water-closets, earth-closets, or privies, for the reasonable use of all persons so employed; and wherever male and female persons are employed in the same factory or workshop, a sufficient number of water-closets, earth-closets, or privies, shall be provided for the use of each sex, and shall be plainly designated, and no person shall be allowed to use any such closet or privy assigned to persons of the other sex.

SEC. 3. When it appears to an inspector of factories that any such act or fault in relation to any drain, water-closet, earth-closet, privy, ash pit, water supply, nuisance, or other matter in a factory or in a workshop, included under section one of this Act, is punishable or remediable under any law of the Commonwealth relating to the preservation of the public health, but not under this Act, such inspector shall give notice in writing of such act, neglect, or default to the Board of Health of the city or town within which such factory or workshop is situated; and it shall thereupon be the duty of such Board of Health to make inquiry into the subject of the notice, and to take such action thereon in the way of enforcing any provision of law within its authority as the facts may call for.

AN ACT TO SECURE THE PROPER VENTILATION OF FACTORIES AND WORKSHOPS.

SECTION 1. Every factory in which five or more persons are employed, and every workshop in which children, young persons, or women, five or more in number, are employed, shall be so ventilated, while work is carried on therein, that the air shall not become so exhausted as to be injurious to the health of the persons employed therein, and shall also be so ventilated as to render harmless, so far as is practicable, all the gases, vapors, dust, or other impurities, generated in the course of the manufacturing process or handicraft carried on therein, that may be injurious to health.

PROTECTION FOR LIFE AND LIMB.

In some of our factories and workshops no proper safeguards are put up to protect male and female employes from the danger of contact with machinery. Complaints have been lodged with the bureau, by men working in machine shops, of the utter disregard manifested by some of their employers to the safety of the men. I have seen little boys and girls flitting to and fro among running machinery, where a slip or tumble would cause likely the loss of life or limb. Men, women, or children, employed in such places cannot be contented. They cannot be expected to endure patiently their daily lot while breathing a fetid atmosphere, and in momentary danger of being either killed or crippled for life by unguarded machinery. In the great majority of instances, in answer to the question, "What are the safeguards or means of escape in case of fire?" the answer was that there was "none special." In most cases the only escape was by the ordinary stairway. Crowded workrooms on third and fourth floors, with no means of escape in case of fire but a single stairway, are the rule and not the exception. If a fire should occur in the store overhead, those working in cellars under the sidewalk would be like bacon in a smokehouse. Our workshops should be made comfortable and healthy, and those employed therein should be rendered secure against the accidents which are of frequent occurrence. The heartless, criminal negligence of an employer may be, and often is, the cause of throwing an unfortunate workman or workwoman upon the charity of the world, or of sending them crippled for life to some almshouse. We should have a law which would provide for

protection in respect to the openings of hoistways, hatchways, elevators, ventilators, and for safety appliances that will prevent the fall of an elevator cab or car, in the event of the breaking of the hoisting ropes or machinery, and for properly constructed stairways and fire escapes.

REPORT OF THE CORONER.

According to the reports of the San Francisco Coroner from 1877 to 1887, inclusive, there were one hundred and twenty deaths in that city caused by "crushing," or nearly at the rate of one per month. During the same period, under the head of "burns," eighty-six deaths occurred.

The large number of elevator accidents occurring in San Francisco proves the necessity of a law requiring elevators to be provided with automatic doors. Many accidents result from a neglect of this precaution. Automatic sliding doors are a far better protection than the iron or wooden bar often used, and the plea of economy or expense should not be allowed to stand in the way. The habit of locking the doors of manufacturing establishments directly after the commencement of work is reprehensible in the extreme. In one canning factory which I visited, in which more than two hundred females were employed, I had much difficulty in getting inside, so securely was every gate and door locked or barred. The practice is foreign and obnoxious to our American ideas of free labor, and should not be tolerated. The loss of life that may ensue in case of fire is terrible to contemplate. Men, women, and children, all locked in. In Massachusetts they have a law to prevent this, which was passed in 1884:

SECTION 1. No outside or inside doors of any building, wherein operatives are employed, shall be so locked, bolted, or otherwise fastened, during the hours of labor, as to prevent free egress.

SEC. 2. Any person, firm, or corporation, being the owner, lessee, or occupant of any such building, who shall, after receiving five days' notice in writing from one of the inspectors of factories and public buildings, neglect or refuse to comply with the provisions of the preceding section, shall forfeit to the use of the commonwealth not less than ten nor more than fifty dollars.

Each story of every building where persons are at work should be amply supplied with the means of extinguishing fires; and all main doors should open outwardly. There is an immediate and pressing want for efficient fire escapes in the majority of places where workingwomen are employed.

The proper construction of fire escapes and the best mode of attaching them to buildings are subjects of vast interest to the people. The inventive genius of the country is being directed to this all important subject, and all buildings, in which a considerable number of persons are dwelling or are engaged in any manner, should be suitably provided with fire escapes.

EVIL EFFECTS OF STANDING ALL DAY.

In the course of this investigation nearly all the principal stores where females are employed as saleswomen were visited, and with very few exceptions it was found that they were compelled to stand behind counters from ten to fourteen hours a day, with the exception of the hour allowed for meals. Under the heading of "General Conditions," some illustrations of this fact can be found.

In most of the eastern cities this disregard of what is due to the physical necessities of women is no longer tolerated, and the law has stepped in to protect those rights which grasping firms would otherwise treat with contempt.

The firm of Weinstock & Co., of Sacramento, have set an excellent example, by supplying their female employés with seats, which, when not in use, can be easily let down from the brackets which support them, and fall by the side of the counter, where they do not obstruct the passage nor take up any room.

Dr. McCourt, of New York, says: "Long hours in a standing position would superinduce specific diseases of the uterus."

Dr. Day, of the same city, says: "Females who are compelled to stand on their feet all day are subject to whites and leucorrhœa, which generally hangs on to them even after marriage, and results in miscarriage and unhealthy children."

Dr. F. B. Kane, of San Francisco, says: "Very many times my attention has been drawn, professionally, to the injury caused by the long hours of standing required of the saleswomen in this city. Frequently, from before eight in the morning till nine at night, with hardly any interval to get their meals, they are bound to remain in the one position, most calculated to cause the manifold diseases peculiar to their sex, and direfully does Nature punish the disobedience of her laws. Should you, through your report, be able to alter the existing custom in this regard, you will confer a lifelong benefit to thousands."

Dr. C. A. Clinton, of the San Francisco Board of Health, says: "The rule compelling saleswomen in stores to stand from nine to twelve hours a day is barbarous, and it should be abolished. I am decidedly of the opinion that it is highly injurious. It will certainly aggravate any existing complaints; and, still more, it will and does have a tendency to induce complaints in persons previously free from them. The rule is inhuman, and it is especially injurious to females in regard to the diseases peculiar to the female sex. They should, I think, have suitable opportunities for rest. Another point: I am informed that there are some stores in this city where saleswomen are employed, in which there are not suitable toilet facilities; and the girls are obliged to go from morning until evening without any opportunity to obey the usual calls of nature. All of this is necessarily injurious, and should be rectified. I understand that the ladies of Chicago have taken this matter in hand, and they decline to patronize establishments in which the cruel rule referred to is in force. Let their sisters here imitate their laudable example, and boycott all such places."

The President of the State Board of Health, Doctor H. S. Orme, of Los Angeles, says: "I would state that upon investigation I find that in all, but one or two, stores of this city seats are provided for saleswomen, who are compelled to stand only when attending to customers. Standing behind a counter from nine to twelve hours a day is very detrimental to the health of any female, and such a practice should if possible be prevented by law."

The objections made on the part of the employers are that to allow a saleswoman to sit behind the counter is unbusinesslike, would encourage laziness, and the chairs or stools would obstruct the passage way. One of our leading dry goods merchants told me he would rather discharge all of his saleswomen than allow seats behind the counter. It was contrary to all his firmly rooted ideas of business goaheadness. "If women can't stand," said he, "as well as the men, why let them go. I do not care what physicians say, or what the Legislature may do in the matter; I can get along without female hands."

The following are the laws in force on this subject in the States of Missouri and Massachusetts:

MISSOURI LAWS—SEATS FOR FEMALE EMPLOYÉS.

AN ACT FOR THE PRESERVATION OF THE HEALTH OF FEMALE EMPLOYÉS.

SECTION 1. That it shall be the duty of all employers of females in any mercantile business or occupation, to provide and maintain suitable seats for the use of such female employés, at or beside counter or work bench where employed, and to permit the use of such seats by employés to such an extent as may be reasonable for the preservation of their health.

SEC. 2. That any violation of this Act by any employer shall be deemed a misdemeanor, and on being thereof convicted shall be punished by a fine not exceeding twenty-five dollars, at the discretion of the Court. And it is hereby made the duty of the Commissioner of Labor Statistics to secure, as far as may be in his power, a proper observance of the provisions of this Act.

SEC. 3. All Acts or parts of Acts inconsistent with this Act are hereby repealed.

MASSACHUSETTS LAWS.

SECTION 1. Every person or corporation employing females in any manufacturing, mechanical, or mercantile establishment in this commonwealth, shall provide suitable seats for the use of the females so employed, and shall permit the use of such seats by them when they are not necessarily engaged in the active duties for which they are employed.

SEC. 2. A person or corporation violating any of the provisions of this Act shall be punished by a fine of not less than ten dollars nor more than thirty dollars for each offense.

BOARDING AND LODGING.

The tabulated statements of female wage earners, under the head of "Personal and Financial Conditions," show that remarkably few of them live in boarding and lodging houses. In answer to the question, "Where do you live?" the answer almost invariably was "at home." It will be many years before the girls of California will be so crowded out by increase of population as to necessitate their leaving the parental roof to seek for work in strange fields of labor. For those who do live in boarding houses the cost varies little from that paid in eastern cities, which on an average is from \$3 to \$4 a week. Many young women in San Francisco—chiefly saleswomen and those employed in light, clean work—take their meals at restaurants, where they are supplied with very good fare at from 15 to 25 cents a meal. In the restaurants of San Francisco and other cities of California, where the plan of charging 25 cents for three dishes prevails, a bill of fare is served, which for extent, variety, and cheapness, cannot be surpassed. This is owing to the fact that California is the land of the fruit and the vine, and the meat and vegetables supplies superabundant for the wants of our comparatively small population. Notwithstanding the cheapness of living, it will be seen on reference to the tables that very few young women stated that they had saved any money at the end of a year's labor. This is not surprising, considering the low wages they receive. At a dollar a day, a girl who wants to dress decently can save nothing. In no case did a girl confess a deficit, but several acknowledged that they could not support themselves without the assistance of relatives or friends, which amounts to about the same thing. The hardships and evils attending the monster tenement house system of eastern cities are scarcely felt or appreciated in San Francisco, for we have not reached that *high* degree of civilization where a girl after a hard day's work must climb about half a dozen flights of stairs to reach her room. During the course of this investigation a great many workingwomen were visited at their homes, and, with few exceptions, their rooms were found clean, tidy, and well ventilated. In many parts of San Francisco the health conditions are not good, owing to bad sewerage and the unclean condition of the public thoroughfares. It will

be observed by reading the tables of "Home Conditions," that but few of the girls working in the factories and workshops of San Francisco live in houses owned by their parents. The reverse of this is the case in other cities of the State.

The following table shows the average rents charged for houses and rooms in San Francisco:

CLASS OF DWELLING.	Per Month.
Tenements of from three to seven rooms.....	\$10 00 to \$25 00
Flats of from three to six rooms.....	8 00 to 20 00
Rooms, single.....	4 00 to 8 00
Rooms, double.....	5 00 to 10 00
Rooms, suits of from two to three rooms.....	10 00 to 20 00
Rooms for housekeeping, of from three to four rooms.....	10 00 to 15 00

DRESS.

It is interesting to note the "at home" and "at work" experience of workingwomen. Speaking of their dress, many girls say that it is almost impossible to buy new clothes, so they have to depend largely upon what is given them in the way of old dresses by relatives or friends. Some say that it costs them every cent they earn for board, lodging, and car fare. This matter of dress has a great deal to do with a female's success in seeking employment. A poorly dressed woman is refused on the score generally of "just hired," while a shabbily dressed girl is entirely ignored. For a shop girl especially, it is absolutely essential that she should be well dressed.

It is obvious that dress is a power in the welfare of the working girls. Here lies one of the greatest, if not the greatest, source of temptation to young women. A shop girl is expected to dress well and support herself on a salary of \$5 or \$6 per week. Perhaps she has to contribute to the support of a mother, brothers, or sisters at home. Every day she comes into contact with a fashionably dressed woman in the store where she works. Young women of her own age, working beside her, who have not to pay for board and lodging and who live comfortably at home, spend all their earnings on dress. Is it not natural that she would yield to the temptation to do wrong in order to provide the means to dress like the well-to-do of her own sex? It was given in evidence before me, during an open investigation into the treatment of girls in a coat-making concern, by a young woman, that when she wanted money for dress she gave up sewing for a living and engaged as a domestic, because of better wages. When her new clothes were bought and paid for she gave up the broom for the needle.

Nearly every known house of prostitution in San Francisco was visited during the course of this inquiry into the condition of workingwomen. In a great many cases it was found that it was this passion or desire to be well or fashionably dressed, without the means to gratify it, which led to the downfall. Dr. Day, of the Central Street Dispensary, New York City, says: "I do not believe that any working girl prostitutes herself for the want of the necessities of life, but mostly for want and desire for dress." Dr. Stuyvesant F. Morris, of the Midnight Mission, New York City, says: "Vanity and love for dress had more to do with the matter (*i. e.*, prostitution) than hard work and low wages." The genial climate of San Francisco entices young women out of doors at all seasons of the year, while

their sisters of the East must stay within much of the time to escape the broiling sun or the chilling frost. As a consequence the San Francisco girl wants more money for dress than her eastern prototype. The influences surrounding a young woman's calling have their natural effect upon her personal habits and dress. When she has to work in the same establishment, or side by side with the Chinaman, she degenerates into a careless, slovenly, shabbily dressed woman. A foreman in one of our woolen mills, in discussing the question of the "moral status of women employed with Chinese in the mills" with a lady who takes great interest in the welfare of workingwomen, said: "The whole of it is that we have got these girls down to the same level of the Chinaman—financially, industrially, and socially—and are now reaping the results. The girls are degraded in their own eyes by their surroundings and corrupted by their associations."

In many tobacco factories in San Francisco girls can be seen working in the same rooms with Chinamen, stripping and sorting tobacco, making cigars and cigarettes, their hands dyed by contact with the weed, and their clothing permeated with its scent. The business of itself must be ill-smelling and disagreeable to females, and often produces deleterious effects. But from the surroundings it must prove a still more prolific breeder of moral disease, especially in those factories where the bosses or foremen are Chinamen. Under such demoralizing conditions few of these girls make any effort at personal neatness.

PROSTITUTION.

In order to ascertain to what extent fallen women have been drawn from the wage-earning class, a canvass of the San Francisco houses of prostitution was made by the Deputy Commissioner of this bureau, accompanied by a Special Agent of the United States Bureau of Labor Statistics, and a police officer, detailed for the purpose, through the courtesy of Chief of Police Crowley.

Five hundred and twenty-seven prostitutes were questioned as to their occupation before entering upon a life of shame—whether they were ever married, and whether they ever tried to resume a life of industry since their fall.

Of the number interrogated, fifty-six refused to answer, thirty were negroes who were formerly house servants, leaving four hundred and forty-one white prostitutes who gave replies.

Two hundred and forty-nine, or 56 per cent of this number, were drawn from the wage-earning class. One hundred and four, or 23½ per cent, married from their homes and afterwards became prostitutes, and eighty-eight, or 20 per cent, left their homes single women, and entered direct upon a life of shame.

One hundred and ninety-two, therefore, did not ever earn a living in any respectable occupation. Eighty-nine, or 20 per cent, were sewing women, and sixty-five, or 14 per cent, were domestics.

The following table gives the previous occupations of the women in houses of ill-fame in San Francisco, who were questioned as above:

*San Francisco.**Previous Occupations of Prostitutes.*

Home, married	104	Music teacher	3
Home, single	88	Married, house servants	4
Milliner	11	Laundress, dressmaker	2
Dressmaker	20	Hotel chambermaid	1
Dressmaker, married	22	Fancy sewing	1
Tailoress	4	Silk factory (cleaner)	1
House servants	41	Milliner, married	1
Laundress, married	10	Artificial flower worker, milliner	1
Hairdresser	5	Restaurant waitress, married	2
Shoefitter	9	Kept bar room, married	1
House servant, married	15	Canning factory	5
Married, hotel chambermaid	5	Cloak making	4
Restaurant waitress	2	Woolen mills, married	3
Married, variety actress	1	Music teacher, married	4
Tailoress, married	5	Milliner's clerk	1
Carpet sewer	2	Boarding keeper, married	1
Married, seamstress	3	Telegrapher	3
Seamstress	25	Clerk in jewelry store	1
Laundress	12	Married, grocery store	1
Cook, married	5	Translator of Spanish	1
Florist	4	Refused to answer	56
Shirtmaker, married	1	Negresses, house servants	30
Nurse	5		
Cigarmaker	1	Total	527

San Diego.

In San Diego there are two hundred public women, the majority of whom are in lodging houses; two thirds are Americans. San Diego has a population of thirty thousand, or one prostitute to every one hundred and fifty of the inhabitants. One hundred and twelve are Americans, seventeen French, five German, three English, four Irish, six Spanish, three Canadians, two Jews, two Swedes, one Portuguese, two Belgians, five Africans, one Mexican, two Norwegians, thirty-five Chinese.

Los Angeles.

Los Angeles has two-hundred and eighteen prostitutes, seven assignment houses, seventy-six houses of prostitution. The nationality is very evenly divided: American ninety, French twenty, Africans thirty-five, Chinese thirty-eight, with a miscellaneous nationality of Germans, Jews, Portuguese, Spanish, Mexicans, and English, about thirty-five in all.

PARENTAL NEGLECT.

Indifference and neglect of parents have caused no small percentage of prostitution, as can be seen by the number who have entered upon a life of shame direct from their homes. A short time ago a young girl was picked up in a Kearny Street dive about midnight, and when the arresting officer asked her what she was doing in such a place at such an hour, she replied tearfully that she was lost. She told a pitiful tale about her mother lying sick and starving at home. She said she had gone to a doctor and to a drug store and begged them for God's sake to save her life and give her medicine, but had been refused. Then she wandered about and missed her way. She was accused by the officer of lying, whereupon she broke down and acknowledged that her mother had sent her out begging with a five-year old sister. She was told by her to go into the dives and other

places and "to do things to please the men," so as to get lots of money. She was furthermore instructed to tell the tale about the mother, in case she fell into the hands of the police.

DRIVEN TO SHAME BY WANT.

Many women have declared that before leading a life of shame they had toiled night after night to keep body and soul together. That this assertion is not in variance with the truth, the following advertisement, taken from a morning paper, will bear witness:

PLAIN SEWING AND REPAIRING—FIFTY CENTS PER DAY.

Just think what the temptations are to a girl who is thrown on her own resources entirely, and who has to pay for her board and room, and clothe herself besides, on such a miserable pittance. No friends except those picked up at a cheap boarding-house. The dull monotony of the work, the joyless, colorless existence, the absence possibly of ambition, make a young and reasonably healthy woman yearn for sympathy and crave for some little pleasure. Temperament is everything in such matters, and the best moral training in the world fails to act in every case on a vivacious young woman left alone in a large city. A visit to a theater and some oysters afterwards do not make up such a giddy whirl of gaiety after all, but a girl cannot help feeling kindly towards the man who provides them, and thus throws a dash of color into the monotone of daily drudgery. If the man has money he contrives, perhaps, to let some of it drift into the girl's pocket without at first offending her. Then she comes to look upon him as a bank from which she may draw at infrequent intervals; and, finally, he gets to "paying her board." There is, in the vast majority of cases, no deliberation in the matter. Deliberately bad men—the polished villains of the theater—do not often walk up and down the world seeking whom they may devour. He and she *drift*, and the woman inevitably drifts upon the lee shore. Degradation has to follow. The ties which bind her to respectability and self-respect are loosened, and the next step is the last.

CHINESE PROSTITUTION.

In an official report to the Board of Supervisors the following information regarding prostitution among the Chinese in San Francisco was submitted:

There are apparently in Chinatown but few families, living as such, with legitimate children. In most instances the wives are kept in a state of seclusion, carefully guarded and watched, as though "eternal vigilance" on the part of their husbands "is the price of their virtue." Wherever there are families belonging to the better class of the Chinese, the women are guarded and secluded in the most careful manner. Wherever the sex has been found, in the pursuance of this investigation, under other conditions, with some few exceptions, the rule seems to be that they are here in a state of concubinage merely to minister to the animal passions of the other sex, with such perpetuation of the race as may be a resultant consequence, or else to follow the admitted calling of the prostitute, generally of the lowest possible grade, with all the wretchedness of life and consequence which the name implies. That this is not mere idle assertion the following statement of the number of women and children found in Chinatown in the course of this investigation, and which includes probably nearly

every one living in that locality, will, we trust, sufficiently demonstrate: Living as families, women fifty-seven, children fifty-nine; herded together, with apparent indiscriminate parental relations, and no family classification, so far as could be ascertained, women seven hundred and sixty-one, children five hundred and seventy-six; professional prostitutes and children living together, prostitutes five hundred and sixty-seven, children eighty-seven.

PART III.

TRADES UNIONS—LABOR ORGANIZATIONS.

CHAPTER I.

OBJECTS AND CONDITION.

Combination among the laboring classes has been found to be inevitable. It was a necessary outgrowth of conflict, while conflict has characterized the development of all our industries. It has strengthened the weak against the strong; protected the oppressed against the oppressor. It was the dictates of Nature's first law of self preservation, that caused the workingmen to combine. When capital combined it was inevitable that labor should unite. When corporations and money kings became dictatorial and oppressive it was necessary that money earners should band together. It was the germ-truth that gave life to the labor union—"in union there is strength." Organization is but the embodiment of the principles of unity under which the church, State, and society are regulated and harmoniously conducted. Many of the labor organizations of the United States are founded upon the experience of foreign labor organizations, especially of Great Britain. The objects are to encourage a higher standard of skill, to cultivate feelings of friendship among men of the craft, to assist each other to secure employment, to secure adequate pay for their work, to furnish aid in sickness and in death, and, by proper means, to elevate the moral, intellectual, and social conditions of all their members. The efficacy of organization can be better appreciated when comparative statistics of wages show that in unorganized communities the crafts receive 50 per cent to 75 per cent less than in organized cities. Hence it pays to be a union man. But they must stand by the union, encourage non-union men to join, pay their dues, and strictly attend to its deliberations. So far as secrecy is necessary to build up and render effective labor organizations, they have a right to use it, as much as the trusts and pools and syndicates have their rights through secrecy to "corner" a market. The capitalists who have iron, coal, lumber, and other commodities to sell, can combine and make such corners to keep up the price of their goods, even when the supply is large and the market falling, yet these same parties would deny the right of secrecy and organization to the wage earners. In loud and imperative tones they say: "Your place is to take the market price of your labor. You have no right to say what your labor is worth." Organized labor has the same right to answer: "You may regulate the market price of inanimate, dead commodities, which have no power over themselves, and have no brains or intelligence, but we who keep the wheels of industry in motion, whose ingenuity and inventive skill, whose physical labor and mental powers have added to the productive capacity of the earth, propose to have a voice in fixing wages and regulating our hours of labor and conditions of work. We have families to feed and care for, we have homes and

traditions to cherish, we have human aspirations to satisfy, we have a love for our country and our fellowmen, and we would be less than the beasts of the field were we not to have a voice in saying what we shall receive for the work that we do. Labor is more than a commodity, it is human energy and muscle, reproductive and omnipotent, with a quickening brain and throbbing heart and immortal in the work of civilization." The bricklayers, granite cutters, iron molders, printers, cigarmakers, etc., have International Unions, who can pay higher benefits, sustain wages, make them more uniform, and accomplish more than if simply organized in local unions independent of each other. The Federation of Trades and Labor Organizations, when well conducted so as to command the respect of the public, the Legislature, and the press, is the strongest and most secure protection to wage earners.

ORGANIZATION OF LABOR.

This question of organizing labor for the common welfare of the laboring classes is a most vital one. Who can form an estimate of the powers of the laboring classes of this great republic in the future, when, instead of sixty millions, our population shall be more than six hundred millions? Compare the United States with Great Britain and Ireland, whose territory is one hundred and twenty-one thousand square miles, and maintains a population of thirty-three millions. Give us two hundred and fifty persons to each square mile of territory, as the United Kingdom has, and we will need even more than six hundred millions to occupy and utilize our three and one half millions of square miles of territory. And when we consider the fact that our resources are more favorable for the maintenance of a dense population than those of any other country, we may dream of a population of not less than one thousand millions.

In view, then, of this immense possibility, it is of great importance that we lay a good foundation for the grand future of this country, and this labor question lies at the very center of that secure foundation. If peace, content, and mutual good will are to reign, and anarchy to be avoided, the rights of the laboring classes must be known and respected. Their immense power to demoralize business and make capital timid is well understood. If good is to come from organized capital, it must needs be brought into full recognition and harmonious coöperation with organized labor. It is idle for the one to dream of victory based upon the overthrow of the other. Both must exist, and neither can exist without the other. Mutual confidence seems to be the only common sense method of adjusting this serious matter, and securing equal benefits to both parties, and all others concerned. No permanent remedy is possible until capital and organized labor give mutual and friendly recognition of each others' rights and powers. "Is it right," says the laborer, "that the great corporations, which are the offsprings of our toil, should deny us the right to organize—a right so dear to them, and one for which they would sacrifice their all if we should attempt to infringe upon it?"

It is equally true that, in some cases, labor organizations assume a too arbitrary system of dictation.

"Notwithstanding the errors they have fallen into, trades unions"—says Commissioner Frank A. Flower, of the Wisconsin Bureau of Labor—"have been a great blessing in more than one direction. They have been the means of making workingmen acquainted with each other; of spreading information concerning the extent and diversity of industries; of provoking discussions among artisans, which is always beneficial; of enlisting the

oratory of the pulpit and the comments and resources of the press; of bringing forth many books on the labor problem; of inducing much new legislation; of turning the attention of the entire world to the condition, progress, and needs of the great army of burden-bearers. No improvement in a class of schoolboys was ever more marked than the intellectual change I have seen for the better among a large portion of the wage earners of Wisconsin. They are giving more thought to public affairs, more attention to legislation, more time to reading and discussion. Where, three years ago, we had no real labor newspaper, we now have eight or ten in Wisconsin, and some of them very creditable publications."

LABOR VERSUS CAPITAL.

It is the want of organization and united action that causes the wage earners such failure in establishing their natural rights. It is a manifestation of cowardice and imbecility to whine about hard times and the oppression of monopoly, when the power to crush it is within reach, and they have but to stretch forth their hand and strangle the viper. "The chairs we set on," says the Wisconsin Commissioner, "the whisky we drink, the medicine and drugs prescribed to preserve our life and health, the oil that lights our chambers, the lumber that shelters us, the coal that warms our home and cooks our food—in fact, almost every principal necessity is kept up in price by combinations, rings, and pools."

Labor, on the other hand, can also combine and keep up its price. Workingmen can also pool their issues, and make a joint attack upon force arrayed against them. Take an example: The workmen engaged in the manufacture of glass are the most thoroughly organized craft of any skilled labor. By a complete concert of action they were enabled to enforce their demands. They demanded a raise in wages and they got it. The manufacturers, claiming to lose by this demand, formed a combination and made money rapidly. The glass workers now get \$30 to \$40 per week; apprentices, \$15 to \$20; and the people are paying for it out of their own pockets. Wage classes are justified in agitating for higher wages to preserve the standard of wages in the craft; but the demand must be within the bounds of all reason. When they ask for an increase of wages they should accompany that request, if necessary, with a proposition to the employers to meet and discuss their differences with a view to an amicable arbitration, and thus they would be within the limits of all acknowledged rights.

Such a course can be defended in law and in equity. When the employers refuse to accede to an offer of arbitration they show that they are controlled more by the spirit of selfishness than the sense of justice. "The relations of employer and employé are no longer subject to the traditions of the lash and the auction block. They are no longer master and servant, proprietor and property, lord and serf. They are, before the Courts of law and public sentiment, the equal parties to a simple transaction, and the same lawful privileges are guaranteed to both. Among those lawful privileges none can be more sacred than the right of association for the advancement of common interests. It is enjoyed without question in every field of activity. It has been found equally advantageous in the social, moral, professional, and scientific, as well as in the commercial and industrial spheres. But to exercise that right individually and deny it to another should never be tolerated upon American soil."

LABOR ORGANIZATIONS IN CALIFORNIA.

Upon assuming the duties of Commissioner of Labor, I found there was a great lack of that friendly feeling and mutual consideration which should exist between this bureau and the labor organizations of the State. It was chiefly owing to the representations made to the Legislature by the friends of organized labor that the bureau was created, and I felt it incumbent upon me to so conduct its affairs as to restore confidence in its usefulness on the part of the working classes. This should be done without in the least pandering to the wishes or views of extremists, or acting in a partisan spirit in any case where I should be called upon to investigate any differences between capital and labor. The necessity and justice of thus acting with strict impartiality was pointed out to me by our late deeply lamented Governor, Washington Bartlett. I was convinced that if it could be seen by the wage earners of the State that the officers of the bureau were really in earnest in their endeavors to accomplish fruitful results, it would only be a question of time when confidence would be restored, and coöperation secured. In this I was not disappointed. Officers and members of the labor organizations who, at first, refused to answer questions, or render any assistance, after a few months turned completely around, and became our friends and co-workers.

Again and again I have been invited to address labor organizations on matters of interest to them in the line of industrial statistics, etc.

Following the example of the experienced and indefatigable Labor Commissioner of New York, Charles F. Peck, I addressed the following circular to the several labor organizations of the State:

To the Officers and Members of ——— :

GENTLEMEN: For the purpose of mutual assistance and joint benefit, it is my desire to establish harmonious intercommunication between this bureau and the labor organizations of the State. Promotion of the interests of the working classes is the main object for which bureaus of labor statistics have been created in about twenty States of the Union. At no time in the history of the labor movement have matters, which affect the wage workers, received so much attention as now. Demands for reform and improvement in their condition are loud and imperative. Real and permanent reforms, however, cannot be secured unless the demand for them is based upon carefully collected statistics. Laws for the protection and amelioration of the working classes can only be made when the Legislature is put in possession of thorough and reliable facts. A bill may be otherwise perfect, and every reason exist for its passage, but if the promoters of it have nothing but guesswork to urge in its favor it has a hard road to travel and but slim chance of becoming a law. It must be borne in mind that most of the members are from rural districts where there is little or no labor organization, and many of these, therefore, cannot comprehend the wants of the working people in industrial centers. Hence the necessity for cordial coöperation between the labor organizations and this bureau. The former help to gather the facts, and the latter presents them in proper shape to our law makers.

The attempt to collect statistics by mail has heretofore proved a waste of money; yet this is the means on which I must chiefly rely, no other being provided by law. It is, after all, only with the aid of the labor organizations of the State, and the personal help of those who hold official or prominent places in them, that most of this work can be done.

Blank forms, indicating the lines of inquiry on which the bureau is engaged, together with reports and statements, as soon as published, will be forwarded to all labor organizations that furnish their addresses. I would suggest that you select a committee or an individual from your body, whose duty it would be to supply the information asked for by this bureau, and to fill out the blanks you may receive.

Practical suggestions and recommendations, either in person or by letter, are invited at the rooms of the bureau, which are open from 9 A. M. to 5 P. M.

Respectfully yours,

JOHN J. TOBIN,
Commissioner.

With few exceptions, officers and members of the organizations to whom I had sent these circulars entered into the spirit of the movement, and cordially responded to my request whenever made in person. Blank forms they would not, and will not, fill out; but any questions asked in person

have been readily answered, except in a few instances. In the case of one well known organization, this objection to give information concerning its strength and progress I can only ascribe to the lack of a healthy condition of internal organism. If its affairs were progressing satisfactorily, there would be prompt response to the request for statistical information. As it does not come under the head of Trades Unions, or represent any special element of labor, its omission will not be of great moment in this chapter. At another time the officers will probably be more ready to comply with the reasonable requests of this bureau.

I take this opportunity, without any intention of being invidious where so many deserve credit, of expressing the obligations which the bureau owes to Mr. W. L. Wolfe, of Los Angeles, to Mr. W. A. Bushnell, former President, and to Mr. V. H. Hoffmeyer, present President of the Council of Federated Trades of San Francisco.

The labor organizations and Trades Unions in California are yet in an immature state. While some few have shown marked proficiency and great judgment in the adjustment of their affairs, many are liable to those lapses so often condemned by public opinion. Some were formed to meet the exigency of the hour, or some utopian grievance, and have consequently lived only a transitory existence.

If Trades Unions will prosper there must be no ostracism. No association has the right to dictate terms to non-members of the same craft. Men are organized in a common cause, to elevate, morally, intellectually, physically, and financially, those of their own trade. They have no legal or moral right to say who of their trade shall live and who shall starve. A union should not undertake to prescribe inflexible rules to an employer. They should keep in sight the fact that the interests of the employer are identical with their own, and that exigencies may arise when such rules could not reasonably be enforced.

Many differences, which have caused untold troubles and have sent scores to poorhouses, insane asylums, or untimely graves, could have been averted or amicably settled by arbitration. Organized labor has suffered greatly from hasty action—by the inauguration of strikes, which should never have been resorted to.

California has about twenty-five thousand organized wage earners. In San Francisco alone more than \$90,000 a year are paid in monthly dues, not to speak of initiations, assessments, and fines. Los Angeles is pretty thoroughly organized, but its transient population makes unionism very insecure.

Trades Unions in Los Angeles.

The numerical strength of labor organizations in Los Angeles is as follows:

TABLE E.

Bricklayers	120	Wage Workers Union	150
Carpenters, amalgamated	60	Mixed Assembly (men and women) ..	153
Carpenters and Joiners	907	Cooks and Waiters	48
Stonecutters	54	Typographical Union	212
Plasterers	150	Pressmen	40
Plasterers' Helpers	100	Iron Molders	50
Lathers	75	Cigarmakers	10
Plumbers	100	Tailors	87
Plumbers' Helpers	40	Bakers	50
Sheet and Metal Workers	200		
Painters	75		2,701
Sandstone Cutters	20		

Federated Trades, San Francisco.

The organizations composing the Federation in San Francisco number seventeen, and are as follows:

TABLE F.

	In Good Standing.	Member-ship.
Coast Seamen, of San Francisco.....	1,200	1,800
Beer Brewers, Branch 16.....	350	355
Furniture Workers, Branch 15.....	158	163
Furniture Workers, Branch 25.....	53	100
Cigarmakers, No. 228.....	348	348
Typographical Union, No. 21.....	625	750
Pressmen.....	30	70
Harnessmakers.....	41	60
Bookbinders.....	60	60
Musicians Mutual Protection.....	393	393
Journeymen Bakers, No. 24.....	315	398
Confectioners.....	50	51
Wood Carvers.....	25	38
American Bakers.....	84	84
Shoemakers.....	240	680
Typographical Union, No. 36.....	70	71
German Coopers.....	60	60

To this could be added the White Cooks and Waiters, as they are still represented in the Council, but in such a demoralized condition in consequence of their late disastrous strike, that their membership would hardly reach two hundred, a falling off of eight hundred or nine hundred members. The Federation of Trades had a membership, two years ago, of thirteen thousand.

According to a late report of the Typographical Union, the following are the causes of this decline. Its conclusions are worthy of more than a passing notice by trades organizations, as tending to show the great need of unity in organized labor:

The reasons for this decline are various. In a few cases the withdrawal of unions is ascribed to what the delegates representing them claim to be as stated in the charge quoted. But certainly this does not hold in the great majority of instances where unions have withdrawn. A few of the answers received by your committee to their circular letter addressed to labor organizations will illustrate how widely different were the causes operating to effect such withdrawals.

The Iron Molders say the principal reasons for their withdrawal from the Council were: No financial support from trades forming the Council; the ordering of the Spreckels boycott while it was evident the Union Iron Works strike would be lost; and organizations represented which had no existence. They say they will not be likely to again join a federation of any kind, but believe the present one to be an improvement over that of two years ago.

The Brotherhood of Patternmakers say they had no other reason than the joining of their forces to the Patternmakers National League of North America, they thinking that to become a branch of such a league would be much more to their benefit.

The Steamship Stevedores Union say first, our union of seven hundred and fifty is too large, and our assessments would be too high, to support the other unions when they choose to go on a strike; second, they wanted us to support another rival organization on the city front against the riggers and stevedores, who paid us higher wages.

We find that some of the iron trades went out because of having a sub-federation of their own, and because the provision of a strike fund was not sufficient. On the other hand, the Tailors Union will have nothing to do with the Federation as a constituent element while the Council levies strike assessments.

These are but samples of the widely divergent views taken of the Federation and its workings.

In conclusion, your committee wish to report, that in the light of all the information they have obtained, the arguments they have heard, and the motives which seem to actuate the friends and enemies of the Council of Federated Trades, they believe that this union, in its own interest, and for the good of organized labor, should continue its active and earnest support to the Federation; that no good, and probably great harm,

would be done to the interests we have most at heart, by the withdrawal of this union; that our delegates should set an example of earnest work to the lukewarm and selfish in and out of the Federation. That the Federation should have sufficient financial help from all unions to enable it to carry on its work in a thorough and becoming manner; that we can see no way in which good could come of destroying what has been builded with the mere hope of building better on the ruins of what now is a useful though comparatively small gathering of labor unions.

Trades Unions of San Francisco.

The numerical strength of trades unions in San Francisco and vicinity is as follows:

TABLE G.

Journeyman National Union		Glovers Union, K. of L., No. 7,546..	150
Bakers, No. 24.....	400	Glass Blowers.....	28
American National Union Bakers,		Harnessmakers.....	60
No. 51.....	80	Hat Finishers.....	10
Italian and French Bakers.....	68	Horseshoers.....	82
Brewery Employés, No. 16.....	335	Iron Molders.....	500
Brakemen.....	126	Laborers.....	300
Brewers and Malsters.....	325	Lasters.....	140
Boot and Shoemakers.....	609	Long Shore Lumbermen.....	250
Brick Handlers Protective Union..	104	Licensed Steamship Officers.....	184
Bookbinders.....	75	Longshoremen.....	242
Journeyman Butchers Protective..	142	Lumbermen's Protective.....	141
Barbers Benevolent Association...	115	Machinists.....	450
Boilermakers and Iron Ship		Metal Roofers.....	73
Builders.....	254	Musicians Mutual Protective.....	410
Bag and Satchel Makers.....	11	Marine Firemen.....	200
Bricklayers.....	300	Painters (journeymen).....	100
Cane and Willow Workers.....	22	Painters (fresco).....	10
Confectionery and Cake Bakers....	57	Patternmakers.....	70
Cigarmakers International, No. 228.	345	Plumbers and Gasfitters.....	85
Cigarmakers International, No. 253.	17	Plasterers.....	175
Cigar Packers.....	24	Pavers.....	35
Caulkers.....	200	Pressmen, No. 24.....	145
Coopers Journeymen (English).....	120	Riggers.....	108
Coopers Journeymen (German).....	58	Shipwrights Association.....	300
Core Makers.....	24	Stevedores Protective.....	450
Cornice Workers.....	50	Riggers and Stevedores.....	214
Candy Makers.....	60	Ship and Steamboat Joiners.....	80
Carpenters and Joiners.....	700	Stone Cutters.....	250
Carpenters (German).....	165	Steamship Stevedores.....	700
Coast Seamen, San Francisco.....	2,785	Steamship Firemen.....	218
Coast Seamen, Port Townsend		Steamship Sailors.....	1,200
Branch.....	95	Tailors.....	255
Coast Seamen, Eureka Branch.....	113	Teamsters (coal cart).....	100
Coast Seamen, San Pedro Branch...	228	Typographical, No. 21.....	630
Coast Seamen, San Diego Branch...	75	Tanners and Curriers.....	213
Council of Building Trades.....	84	Typographical, No. 36.....	60
Draymen and Teamsters.....	90	Wharf Builders.....	77
Dry Goods Men.....	170	Woodcarvers.....	39
Engineers, Stationary.....	125	Yardmasters.....	53
Engineers, Marine, No. 35.....	450	White Cooks and Waiters.....	1,260
Furniture Workers, International		Upholsterers (carpet).....	25
No. 15.....	105		
Furniture Workers, International		Total.....	19,379
No. 25.....	75		

During the time of what is known as the Spreckels strike, nearly all the water front organizations withdrew from the Federated Trades Council, and have since formed themselves into "The Wharf and Wave Federation." The nature of labor organizations along the water front is such as not to be clearly understood by members of other unions who have never come into contact with the peculiarities of seafaring men. In order to combat more effectually with united capital, to place themselves in a better position, to resist the unfair and sometimes arrogant demands of monop-

lists by a uniform method of procedure, the Wharf and Wave Federation was formed. At present its total membership is six thousand five hundred and seventy members, composed, respectively, of the following unions:

TABLE II.
Wharf and Wave Federation.

Independent Longshoremen.....	300	Steamship Sailors	1,600
Stevedores Protective.....	450	Coast Seamen	3,000
Steamship Stevedores Protective ..	700	Coal Cart Teamsters	100
Lumbermen's Protective.....	300		
Riggers Protective.....	120	Total.....	6,570

The other water front organizations, not as yet connected with the Federation, are as follows:

Water Front Unions.

Marine Firemen	200	Licensed Officers (captain and mates on steamship)	184
Shipwrights	300		
Ship Caulkers	200		
Riggers and Stevedores	214	Total	1,548
Marine Engineers.....	450		

Brewery Employés Union, No. 16, of the Pacific Coast.

This union was formed in June, 1886, under the name, "Brewery Workmen's Union of San Francisco." In August, 1886, a reorganization took place, the name being changed to "Beer Brewers and Malsters Union of the Pacific Coast." In October, 1886, a branch of this union was organized in San José, which is still in a flourishing condition, numbering thirty-four members. In March, 1887, another branch was organized in Boca, Nevada County, having at present seventeen members, all the journeymen brewers and malsters employed in Boca. The trade is mainly in the hands of Germans or German-Americans, in consequence of which their language was predominant, and was used exclusively in the meetings of the union and its branches. But in July, 1887, after the strike, it was found necessary to form a branch for those few English-speaking employed in this city, and who were compelled to join the organization. Thus the so called English branch, or Branch No. 3, was organized. All Germans wishing to become familiar with the language were permitted a transfer, in consequence of which this branch has increased to twenty-two members, with every prospect of a greater increase in the near future. Therefore the membership of the beer brewers and malsters of the Pacific Coast is divided as follows:

1. San Francisco Brewers and Malsters (German).....	207
2. San José Brewers and Malsters (German).....	33
3. Boca Brewers and Malsters (German).....	17
4. San Francisco Brewers and Malsters (English)	22
5. Scattered in the interior (German).....	46
Total	325

In April, 1887, the organization joined the National Brewers Union of the United States. At the last National Convention, held in Detroit, September, 1887, the name was changed into the National Union of the United Brewery Workmen of the United States. This was done in order to include into the organization coopers, beer wagon drivers, firemen, engineers, etc.

This necessitated a change of name, which accordingly was done, reading now, The United Brewery Workmen's Union, No. 16, of the Pacific Coast; although they are better known as the Beer Brewers and Maltsters Union. In October, 1887, the Brewery Coopers were organized as a branch of their union, which ultimately developed into an independent organization, as it took in coopers working in wine cellars and cooper shops. At the same time the Beer Drivers Union of this city was formed into a branch, but owing to the hostile actions of the beer bosses, who threatened to discharge every driver if he should join the branch, and compelling them to sign an agreement, the agitation was limited to secret work, necessarily retarding its growth, although at present the Drivers number eleven members, who it is said are sincere and determined. In the spring it is the intention to organize branches in Sacramento, Los Angeles, and Portland, Oregon. The general status of the union is that every member must be in possession of his intention papers, at least, and must, as soon as he is entitled, procure his citizen papers, which laws are peremptory. The union favors independent political action, and voices such sentiments freely through its organ *Die Brauer Zeitung*, a widely circulated medium, published in New York.

A general meeting is held in this city every month. All men working in a brewery are eligible to membership. The work in the brewery proper is divided into three departments: First, washhousemen, with wages from \$14 upwards. Second, brew, copper, and fermenting department, employing kettlemen and cellar-men, with wages from \$16 upwards. Third, malt-housemen, with wages as the last. For the first two departments overtime is paid at the rate of 30 cents an hour; for the last, with 50 cents an hour. Ten hours constitute a day's work. In the lager beer departments the men work the ten hours out in one stretch, with a short intermission for meals. In the steam beer departments the division of the day's labor is left to the mutual agreement between men and foremen. The relationship between the men and their employers is satisfactory; as the result of a contract made between the union and the bosses on the twenty-second of July, 1887. The good condition of the members is entirely due to this contract, which was concluded by the assistance of the Council Federated Trades, and which reduced the working day from fourteen to ten hours, and in some cases raised the wages from 25 to 30 per cent, besides making weekly payment of wages the rule, instead of monthly. The union is desirous of introducing an apprentice system, making it compulsory for the employes to learn the trade properly before they can claim the higher wages, as it takes from three to five years to learn any of the branches of the work thoroughly. An employment office will also soon be established.

Brick Handlers Protective Union.

The work of the men consists in bringing the bricks from the yards to the transporting vessel, and are paid partly by the day and partly by the thousand bricks. The union is instrumental in keeping the wages up, as the non-union men are working, even now, at considerably reduced rates. It sometimes happens that a vessel has to load or discharge its bricks in a hurry, to catch the tide, then the work is by the piece, and the crew of a vessel have a right to share in it. The union has just won a fight against reduction of wages by the Patent Brick Company, whereby an agreement was made with the Sacramento Brick Company that no work was to be done only by union men.

Boot and Shoemakers White Labor League.

There are about two hundred and fifty women who find employment in this city. There are no women in the union. There is no fixed scale of wages, but the by-laws make it impossible for a member to take the position of another, who has been discharged, for less wages than he got. There are many departments in the shoemaking trade, and few men, only, understand them all. The bottomers and lasters work by the piece, while the sole leather men and cutters by the day. Wages range downwards from \$18 a week; the average is about \$13. Most of the members prefer piece work. The Chinese competition is continuously forcing wages down. There are between three and four thousand Chinamen employed in this trade. The league only contains those white men who work in the factories, not those employed in the custom trade. It would take about two years to learn one branch of the trade. There is only one firm antagonistic to the league.

Bookbinders Union.

The men work ten hours a day, and only in extraordinary cases does a dull month occur. The union has no fixed apprentice system, and the employers are trying to get as many of them as possible into their shops. The union relies mainly on the difficulty of the work to keep too many apprentices out. There are many girls working in the shops, but they mostly do the folding work, not the proper binding. The union pays sick benefits.

Journeyman Butchers Protective Benevolent Association of the Pacific Coast.

Wages range from \$7 to \$22 50 a week. The average is about \$15 a week. The work is steady all the year round. The working day is from 4 A. M. to 6 P. M. Sunday is not free. There is a city ordinance against keeping butcher shops open on Sunday, but doubts are entertained as to its validity. In some markets the men have to go to work on Saturday at 4 A. M., and do not leave off until 10 P. M., to resume work again on Sunday morning from 7 A. M. till 12 noon. This Sunday work is not paid extra. The union is agitating the questions of shorter hours and no Sunday work.

Cane and Willow Workers Union.

It takes but a few weeks to learn something of the work, but unless the man is a quick worker he will not be able to make wages, and to become that will take about a year. Wages range from \$1 to \$2 a day. The union has been instrumental in driving the Chinese out of the trade, and also in raising the wages a little. There are three shops in this city employing respectively fifteen, eighteen, and twenty men. There is only one shop in which the union is properly organized. The union is opposed by certain men who work in one of the shops on fancy chair work, and who are paid at the rate of \$18 a week. To be able to pay these high wages the employer keeps other wages down, and as the union wages are lower the men refuse to join the union. The trade is suffering from foreign importations of demijohns from Hamburg and Antwerp. There is a duty on such importations, which, however, seems to be evaded in some mysterious manner.

Cigarmakers International Union, No. 228.

The union has a scale of wages. All work is done by the piece. A slow worker may make only \$7 a week, while a fast one may reach \$21 or \$22.

The average is about \$10. The eight-hour day is introduced everywhere, and the work is steady all the year round. There is a good feeling between the men and the employers, who are thoroughly familiar with all the union rules. Each factory has its shop collector, who collects the dues, and in special cases, calls special meeting of the shop. The union pays sick benefits and strike benefits; also \$50 burial money. There is also a traveling benefit of \$20 paid, to allow a member to go to a place where he can find work. This amount must, however, be refunded to the union as soon as the beneficiary is able to do so. The union is directing its efforts principally against the Chinese competition. There are about four thousand five hundred Chinese cigarmakers in this city. There are about one hundred and sixty factories employing white labor, exclusively. The work is considered rather unhealthy on account of the dry dust flying about in the shop, which, when inhaled, seems to affect the lungs of a great many of the men.

Journeyman Bakers National Union, No. 24.

This is a German-speaking union. Most of the men have learned their trade in Europe. It takes about three years to learn it. A day's work is eleven hours for the five days and sixteen hours for Saturday. No Sunday work. There is another union in this city in which many of the bosses are members. This union is mostly to be remembered for having got an ordinance passed against Sunday work in bakeries, only to see the same first violated and then declared invalid by the Courts, through the exertions of one of its own members, who had himself been one of the first to sign an agreement to keep the ordinance. This other union is now only a beneficiary association for bakers. The work is considered very unhealthy, on account of the exhaustive night work and the poor ventilation in the cellars where the men must work; also, because the work forces a man to run out often from the heated rooms into the chilly night air. There are about one hundred and twenty-four establishments giving employment to bakers in this city. The union is at present engaged in a fight with about twenty of them. Union No. 24 controls Oakland and Sacramento; in the former there are a few American shops. In Sacramento there are twenty members, forming a section of No. 24. They have absolute control of the bakeries in that town. There are some ten shops. The average wages there are \$13, and \$5 for board, and the day's work consists of ten hours, with twelve for Saturday. No. 24 pays no benefits of any kind. Initiation fee, \$3, and monthly dues 50 cents.

American Bakers National Union, No. 51.

The union has a fixed scale of wages, ranging from \$12 to \$20 per week, with board. There are men working for less than union wages, with the permission of the union, but should any of these lose their job, the union does not take up their case, further than to forbid any of its members to go in the places of such men at lower wages than these had received before. Should the men lose their job because they had demanded union wages, the union is ready to back them up. The union has just succeeded to introduce the ten-hour working day, with fourteen hours for Saturday. The American bakers complain that the importation of bakers from Germany, willing to work for reduced wages, some years ago lowered the standard of wages in this city very considerably. This has, however, been checked since the formation of the National Union.

Confectionery and Cake Bakers Union, No. 52.

The wages range from \$35 to \$100 a month, with board. Average wages about \$50 a month, with board. There are upwards of eighty establishments in this city where men of this craft can find work. The union has just succeeded in introducing the ten-hour working day and in abolishing Sunday work. This is a German-speaking union. There is an opposition union in this city, which the bakers claim was started by money given by the antagonistic bosses, for the purpose of breaking up the National Union, and which now counts about forty members.

Cigarmakers International Union, No. 253, Oakland.

There are many small factories in that city, but in some of them the boss himself is the only worker. The work is all paid by the piece. All members of the union are at work at present. The union is principally directing its efforts against the Chinese competition. The consumption of cigars in Oakland alone should support more than two hundred men comfortably if the Chinese were out.

Coast Seamen's Union of the Pacific Coast.

Wages on the coast vary at different times of the year. During the winter they are lowest. The limits seem to be \$15 and \$55. The average may perhaps be set at \$35, with board. Each man gets about nine months' work during the year, and must pay \$60 board for the remaining three months. Outside his board a seamen can therefore count on earning about \$250 a year. The seaman works at least twelve out of every twenty-four hours when at sea, but on the coast he has often got to do much more work than that. The steam schooners running in the lumber trade, load and discharge at day, and then run from port to port during the night, thus making it necessary for the men, tired out after a hard day's work, to keep watch or steer during the night. The union was formed to elevate its members morally and intellectually. No strikes have occurred during the last year, but by a quiet pressure the men have obtained higher wages and better treatment by the officers. The wages on the coast at present are for sailing vessels:

Captains	\$100 to \$125 per month.
First officers or first mates	\$50 to \$60 per month.
Second officers or second mates	\$45 per month.
Cooks or stewards	\$50 to \$60 per month.
Cabin boys	\$15 to \$20 per month.
Sailors to bar harbors	\$40 per month.
Sailors to outside ports	\$45 per month.
Sailors to Mexico and South Sea Islands	\$35 per month.

Many captains of steam schooners sail on percentages.

On the steam schooners the members of the union have enforced 50 cents an hour for overtime and \$3 extra for Sunday work. The work is healthy but dangerous, the sea every year claiming a large number of victims. A combination between the captains and boarding-house keepers places the sailor, in many regards, absolutely in their hands, so that he virtually becomes a money-making machine for them, being robbed, as soon as he comes ashore, of what he earned on board; the captain afterward dividing the spoils with the boarding-house keepers. The union is therefore agitating to get the power of shipping in the hands of the men themselves, and to abolish the boarding-house system. To alleviate the hardships of the

deep water sailor the union is further agitating for the enactment of the following laws:

That no advance money shall be given.

In order to enable the sailor to ship himself, without the intervention of any boarding-house master or other person, that no one be allowed to appear with him before the shipping commissioner when he is engaged by the captain and signs the articles.

That no boarding-house master or other person, who has derived any profit from the sale of general merchandise to sailors, be appointed to the position of shipping commissioner.

That all cases for the recovery of seamen's wages in the United States Courts must be given preference over all other cases, and be tried within forty-eight hours after the filing of the libel, so that the seaman, if left at any port, can get justice there before the ship leaves, perhaps never to come back again.

Wages Paid to Seafaring Men.

Reference to the following tables will show that the vessels of the United States pay the highest rate of wages, besides costing more for maintenance of the crews than those of any other nation. This, of course, refers to voyages commencing in the United States; but even where they commence in foreign ports—that is, ship their crews and obtain their supplies at a foreign port—they then average higher rates than vessels of other nationalities as regards cost of maintenance.

No comment is necessary in respect to the wages question, as the general labor market of the United States fixes that for shipment in home ports.

British vessels in domestic ports can procure crews for from 37 to 32 per cent lower than those paid on American vessels, which is a serious item in the disbursement account. Then, again, the cost of maintenance on American ships is about 40 cents per day per man against the English 29 cents, or a difference of 27 per cent in favor of the latter. When it is considered that provisions, such as beef, pork, and flour, which are the principal articles of food consumed, can be obtained in the United States, if anything, at a lower price than in England, it seems remarkable that the crews of our vessels should cost 27 per cent more per man for maintenance; yet such appears to be the case. It is an acknowledged fact, that the living on board our vessels is superior to that of other nations, and it is generally asserted that larger quantities of food are supplied to the crew, the scale of provision laid down by Congress being rarely, if ever, resorted to. The wages paid on vessels belonging to Norway and Sweden, Russia, Germany, Denmark, Austria, and Spain, average about 47 to 50 per cent lower than those of United States vessels, and the cost of maintenance about 32 per cent less, excepting those of Germany, which cost about ten per cent less only.

TABLE I.

Statement showing the rates of monthly wages paid to officers and seamen on vessels at the home ports of the various nationalities.

NATIONALITY.	Pay.	Less than United States.
<i>Mate.</i>		
Norway and Sweden	\$17 02 to \$19 46	63 per cent.
Russia	17 51 to 19 46	63 per cent.
Germany	17 85 to 20 23	62 per cent.
Denmark	17 99	64 per cent.
Austria		
Spain	43 75	12 per cent.
Great Britain—Sailing vessels	38 92	22 per cent.
Steamships, Atlantic voyages	55 91 to 66 08	
Other voyages, steamships	38 93	
United States—Pacific Coast	50 00	
Atlantic Coast	50 00	
<i>Second Mate.</i>		
Norway and Sweden	11 67 to 15 56	58 per cent.
Russia	13 09 to 15 47	56 per cent.
Germany		
Denmark		
Austria		
Spain	34 06	
Great Britain—Sailing vessels	21 89	37 per cent.
Steamships, Atlantic voyages	46 18 to 58 34	
Other voyages, steamships	29 19	
United States—Pacific Coast	35 00	
Atlantic Coast	30 00 to 35 00	
<i>Seamen.</i>		
Norway and Sweden	9 73 to 10 94	45 per cent.
Russia	9 73 to 11 67	43 per cent.
Germany	9 54 to 10 71	45 per cent.
Denmark	10 94	43 per cent.
Austria	10 70 to 11 19	43 per cent.
Spain	13 62	27 per cent.
Great Britain—Sailing vessels	12 16 to 13 38	32-33 per ct.
Steamships, Atlantic voyages	19 46	
Other voyages, steamships	14 59	
United States—Pacific Coast	20 00	
Atlantic Coast	18 00	
<i>Carpenter.</i>		
Norway and Sweden	12 16 to 14 59	61 per cent.
Russia	9 73 to 11 67	67 per cent.
Germany		
Denmark		
Austria		
Spain		
Great Britain—Sailing vessels	27 98 to 34 06	17 per cent.
Steamships, Atlantic voyages	29 19	
Other voyages, steamships	35 00 to 40 00	
United States—Pacific Coast	30 00 to 35 00	
Atlantic Coast		
<i>Cook.</i>		
Norway and Sweden	10 94	66 per cent.
Russia	9 73 to 11 67	67 per cent.
Germany		
Denmark		
Austria		
Spain	17 51	28 per cent.
Great Britain—Sailing vessels	19 46	40 per cent.
Steamships, Atlantic voyages		
Other voyages, steamships		
United States—Pacific Coast	35 00	
Atlantic Coast	30 00	

TABLE I—Continued.

NATIONALITY.	Pay.	Less than United States.
<i>Steward.</i>		
Norway and Sweden.....	\$10 94 to \$12 16	69 per cent.
Russia.....		
Germany.....		
Denmark.....		
Austria.....		
Spain.....	19 46	49 per cent.
Great Britain—Sailing vessels.....	24 33 to 26 76	36 per cent.
Steamships, Atlantic voyages.....	14 59 to 17 02	
Other voyages, steamships.....		
United States—Pacific Coast.....	40 00	
Atlantic Coast.....	35 00	
<i>Ordinary Seamen.</i>		
Norway and Sweden.....	7 29	46 per cent.
Russia.....	7 29 to 7 28	
Germany.....	5 95 to 7 14	5 per cent.
Denmark.....	8 51	37 per cent.
Austria.....	9 73	27 per cent.
Spain.....	11 19	17 per cent.
Great Britain—Sailing vessels.....	7 29 to 9 73	37 per cent.
Steamships, Atlantic voyages.....		
Other voyages, steamships.....		
United States—Pacific Coast.....	15 00	
Atlantic Coast.....	12 00	

TABLE J.

Statement showing the cost of maintenance, per man per day, on board vessels of various nationalities.

NATION.	Cost of Maintenance.	Less than the United States.
Norway and Sweden.....	22 to 24 cents.	42 per cent.
Russia.....	28 cents.	30 per cent.
Germany.....	36 cents.	10 per cent.
Denmark.....	23 to 27 cents.	37 per cent.
Austria.....	24 to 36 cents.	40 per cent.
Spain.....	30 cents.	40 per cent.
Great Britain.....	22 to 36 cents.	27 per cent.
United States of America.....	40 cents.	

Wages Paid on Pacific Coast Steam Vessels.

As to the wages paid on board of Pacific Coast steam passenger ships, the following schedule was submitted by ex-Governor George C. Perkins, during the investigation into seamen's grievances: "Captains upon the passenger ships, \$200 per month; captains upon the freight boats, \$150 per month. The purser receives upon the passenger ships from \$90 to \$100 per month; upon freight boats, \$75 per month; freight clerks, \$65 to \$75; and the first officer receives from \$90 to \$100 per month on passenger vessels. That includes meals and everything. In port we do not cook. In port we allow them so much money, and find a boarding house for the sailors. We don't cook on board in port. We give our cooks and stewards an opportunity of cleaning up the ships, which is very different from what they do on board the English ships. There is not an English steamship that arrives in New York but that the cooking goes on the same while she is in the harbor. With us, as soon as any of our ships arrive in port the heads of the departments and their assistants are allowed so much money

for board. They go home to their families. Sailors and firemen are given meal tickets, and they go to the boarding house, and those who have families are given money instead. That gives them an opportunity in the steward's department, and in the cooks', to clean up things and scour up things thoroughly and brightly. The first officers get \$90 a month, the third officers \$60 a month, and boatswains the same. The quartermasters are paid the same as the sailors, \$45, but they eat in the mates' room. We carry an electrician on some of the large ships; he receives \$75; the watchman receives \$45; the chief engineer receives \$150 on the large passenger ships, \$125 to \$130 per month on the freight boats, and their first assistant receives \$90; the second assistant receives \$85, and the third assistant receives \$70 on the large ships, and \$65 on the others. Water tenders receive \$55, and the lamp men, \$40; firemen, \$50; coal passers, \$40, our stewards receive from \$75 to \$90; second stewards, \$40; stewardess, \$25; the cook receives from \$60 to \$70; the second cook, \$42, and two of them receive \$45—I think on the Santa Rosa; the third cook receives \$35 to \$40; the fourth cook, \$25 to \$35; baker, \$60; messmen, \$30; messboy, \$25; firemen's messboy, \$25; steerage steward, \$30; head waiter, \$30; pantryman, \$35; second pantryman, \$25 and \$30; waiters, \$25; sailors, \$45."

International Furniture Workers Union, No. 15.

This union is the German-speaking branch of the National Union in this city. There are about four hundred men working in the factories in this city qualified to become members of the union. This includes, however, all men working in the factory, whether actual furniture makers, or varnishers, or machine hands, English or German. The work is half day and half piece work. For day work, the wages range from \$2 50 to \$3. The average would be about \$2 50. The union has been successful in introducing the nine-hour working day. An effort is also made to abolish piece work by most of the members, and in the East the union has been successful in this also. On piece work, a good workman can make from \$11 to \$12 a week. There are about twenty-nine shops and factories in this city. With the exception of one shop, the relation between employers and employes is now satisfactory.

International Furniture Workers Union, No. 25.

This is the English-speaking branch of the National Union in this city. What has been said about the previous union, No. 15, applies also to this union.

Harnessmakers Union.

There are, perhaps, two hundred and fifty harnessmakers in this city. Some few men work the whole year round, but most are discharged during two or three winter months. Many of the bosses are bitterly opposed to the union. There are five large shops in this city. Many Chinese are employed, but mostly in the collar shops. There is no regular apprentice system. The boys make their own bargain with the bosses. Some shops have a great many boys engaged (one shop employs sixteen boys to four men), at \$3 a week. The salary is raised to \$4 for the second year, and every following year brings a little raise. Out of these wages ten per cent is kept back as a guarantee for good behavior, which money is given to the boy when his time is up. After four years, generally, he is considered competent to claim proper wages, and is then given piece work, at which he, however, soon finds that he cannot make wages. He is then forced to

leave the shop. On Saturday the men leave the shop at 5 P. M., but this hour has to be made up during the week. The union is anxious to abolish piece work and reduce the number of boys in the shops. The union has established an employment office, which is working well and is strengthening the union. Wages vary considerably: First-class men, \$18 per week; second-class men, about \$15 per week, and for coarse work, about \$12. Stitchers get from \$7 to \$12 per week. The average for all classes is \$13 50 per week. There are not over a dozen men in the city who get \$18 per week. Most of the coarse work is done by the piece, and low prices rule. In this trade the labor market has been in a rather demoralized condition for some years back. First, the Chinese competition has been against it, the factories using them chiefly to cut down wages; second, too many apprentices. The bosses put on a large number when trade is good; then, as times get dull, they discharge the "jours," but keep the "kids," until soon there are more apprentices than journeymen—they serve three or four years—and then are thrown on the labor market and, not being skilled workmen, are compelled to take whatever employers choose to give them. Reports have been sent East by employers stating that wages were from \$15 to \$27 per week, and men come here after reading such reports and are offered \$9 per week.

Glovemakers Union.

Organization is rapidly advancing among the glove workers, and they have an Assembly of the Knights of Labor, which has a membership of nearly two hundred, sixty of that number being men. In this city there are only about fifty glove workers outside of the organization, and the organized workers hope to draw them in soon. There are fifty in San José, and ten of them belong to the Knights of Labor. Though the glove workers have been organized only a short time, they have accomplished a good deal, and their foothold is constantly growing stronger. Before they organized reductions were frequent in their wages, but this has now been stopped, and the wages of the cutters have been raised 50 cents a day by it. Every factory is allowed to regulate its own schedule of wages, as the members of the assembly were unable to agree on a general rate.

There is no apprentice system in the glove business, and manufacturers do not consider that one is necessary, as beginners are paid wages from the start, and are advanced as rapidly as they develop proficiency. A technical school system would not facilitate the work of the glove manufacturer, as there is an abundance of material for all the work, except cutting.

Glove cutters are scarce, but the manufacturers would be willing to furnish schooling facilities if they could get boys to learn the business. The cutters are paid a higher rate of wages, and get for one grade of work from \$9 to \$18 per week, and for another from \$12 to \$20 and over. The sanitary condition of the workrooms is good.

Musicians Mutual Protective Union, No. 10.

The union has a very minute price list, made necessary by the wide divergence in the work the men are called upon to perform. About half of the members have steady engagements, while the rest are taking job work exclusively. There are some women in the profession, but only as pianists. The average payment for regular engagements is \$20 a week, and the work lasts for ten or eleven months of the year. The average musician will make from \$800 to \$1,000 a year by his profession. There are eight large theaters in this city now running, and employing about

nine men each; there are many smaller places of amusement giving regular employment to musicians. There are nine uniformed bands, besides a number of bands not uniformed.

San Francisco Pressmen's Union, No. 24.

This union is chartered from the International Typographical Union, of which it forms a part. The Second Vice-President of the International Union must always be a pressman. There are, perhaps, fifteen pressmen in this city who do not belong to the union, but the union is sanguine that all will be in before six months. All the large establishments belong to the union. The union has a fixed scale of wages, ranging from \$15 to \$24 a week. Those men who had positions at a lower rate when the scale was fixed by the union, are allowed to hold them yet at the old prices. Fifty-nine hours constitute a week's work, and the work is steady all the year round. The union is about to form an apprentice system, and to introduce the nine-hour working day. The work is considered healthy. The union pays sick benefits.

Typographical Union, No. 21.

There are perhaps two hundred and fifty competent printers outside the union, besides about one hundred and fifty girls. Counting every one who has work in a printing establishment, there are over six hundred men, girls, and boys in this city outside the union. The union has a fixed scale of wages; it ranges on day work from \$18 to \$30 a week. Job and book printers are paid from \$18 to \$25 a week for time work. On piece work a man can make about \$18 a week, if he works full time. The positions on the daily newspapers are paid somewhat higher (\$5 a day of ten hours, with seven composing and three distributing, but the work is very exhaustive, and a man cannot continue for more than a few days). The work is ten hours a day, and steady all the year round. The union is directing its efforts towards making all printers come into the union. The International Union has ordered the nine-hour working day to be introduced everywhere on the first of November, 1887. The business is considered unhealthy, and the excitement attending it easily induces a desire for stimulants. The constant evening and night work on the newspaper tends to exclude the men who work there from all other society.

The number of female printers in the job printing establishments who are members of the union is remarkably small—only three out of a total of fifty-one, but this number has much increased since the investigation by the bureau.

The number of male union printers, on the contrary, exceeds that of non-union by thirty-one out of a total of two hundred and one, or they stand nearly in the ratio of three to two.

In most of the printing houses of San Francisco, due regard is paid to cleanliness, light, ventilation, etc.; but some hold sacred dust and dirt, with their live concomitants. Separate water-closets for the sexes, and proper washing facilities, are not generally provided. In a few offices situated in the neighborhood of down town markets, the prevailing odors are not conducive to health or comfort. The location is not a matter of choice but of necessity, in consequence of the facilities for steam power afforded there.

Typographical Union, No. 36, Oakland.

There are about twenty-five persons in Oakland outside the union, and working at the trade, but only a few of these are eligible to become members. All printing establishments, with the exception of one, are union houses. There is a number of women working in the profession. The union works under the same rules as Union No. 21, but the prices are about 10 per cent lower.

White Cooks, Waiters, and Employés Protective and Benevolent Union of the Pacific Coast.

There are outside the union about three thousand persons engaged in the business, including about seven hundred women. On account of its constitution, the union cannot take the women in as members, but it is anxious to see them organized in a separate union. There is no fixed scale of wages; the men are paid weekly, semi-monthly, or monthly. The union has been instrumental in raising the wages all over. They range now from \$6 a week to \$100 a month for good cooks. The average member of the union makes about \$47 a month, with board. The work is pretty steady. The standard working day is eleven hours. The work falls into many branches, such as cooks, waiters, butchers, porters, dishwashers, clerks, pantrymen, carvers, and others, but all work together in the one union. The union pays sick benefits, and an endowment of \$300 upon the death of a member.

Wood Carvers Union.

The union has a system to regulate the number of apprentices in a shop. One apprentice for each shop, and two if there are six or more men regularly employed in the shop. There is also a scale of wages, ranging from \$3 a day upward. There are a few men working under price with the permission of the union. The highest wages reach \$4 a day, but the average lies very near \$3 50. The work is almost entirely paid by the day. In the East there are three branches in the wood carvers' work—custom work, piano work (the workers of this class of work have a separate union), and machine work. Here no distinction is made between these classes. The trade is considered unhealthy on account of the stooping position necessary during the work. The demand for good carvers has not decreased in this city. The union is principally watching to maintain the nine-hour working day.

The following table (K) is an exhibit giving the names of the labor organizations in alphabetical order, with particulars as to location, membership, condition of trade, etc.

TABLE K.
Labor Organizations in California.

NAME OF ORGANIZATION.	Location.	Date of Organization.	Charter Membership.	Membership at Present	Initiation	Dues—Weekly	Dues—Monthly	Number of Weeks in Year Members are Employed	Proportion of Members at Present Employed	Number Men Outside Union Eligible for Membership
Bakers National Union (journeymen), No. 24	San Francisco.	October, 1885.	30	400	\$3 00	-----	\$0 50	40	75%	35
Bakers National Union (Americans), No. 51	San Francisco.	March 20, 1887.	30	80	4 00	-----	25	-----	-----	20
Brewery Employés Union, No. 16.	San Francisco.	June 20, 1886	50	335	20 00	-----	60	-----	-----	None.
Brewers and Malsters	San Francisco.	June, 1886	52	325	1 00	-----	10	44	95%	None.
Brewery Employés Union.	San José	October 3, 1886	30	35	20 00	-----	60	52	All.	None.
Boot and Shoemakers W. L. L.	San Francisco.	January 12, 1882.	178	609	1 00	-----	25	40	All.	400
Brick Handlers Protective Union	San Francisco.	May 21, 1887.	-----	104	5 00	-----	50	24	-----	400
Bookbinders Protective Union	San Francisco.	-----	-----	75	-----	-----	-----	52	-----	-----
Butchers Protective and Benevolent (journeymen)	San Francisco.	-----	-----	142	-----	-----	-----	-----	-----	450
Barbers Protective	San Francisco.	January 13, 1878.	40	115	5 to 7 50	-----	1 00	52	90%	400
Boilermakers and Iron Ship Builders	San Francisco.	March, 1878	42	254	2 50	-----	50	30	90%	None.
Bag and Satchel Makers	San Francisco.	April, 1882	34	11	1 00	-----	25	26	All.	28
Bricklayers Union	San Francisco.	October 18, 1882	36	300	10 00	-----	25	30	75%	None.
Bricklayers Union	Los Angeles	March 8, 1888.	90	161	15 00	-----	25	40	75%	40
Bricklayers Union	Sacramento	May, 1880	27	31	5 00	-----	25	52	All.	None.
Bricklayers Union	San José	October, 1887	15	40	10 00	-----	50	40	All.	4
Cane and Willow Workers	San Francisco.	-----	-----	22	-----	-----	-----	52	-----	40
Confectionery and Cake Bakers	San Francisco.	February 11, 1887.	30	57	3 00	-----	50	-----	All.	75
Cigarmakers International, No. 228.	San Francisco.	July, 1885	25	345	3 00	\$0 20	-----	52	-----	None.
Cigarmakers International, No. 253.	Oakland	March, 1886	20	17	3 00	-----	-----	52	All.	None.
Cigarmakers International	Los Angeles	April 24, 1886.	9	47	3 00	20	-----	44	99%	3
Cigarmakers International, No. 291.	San José	July 1, 1886.	22	31	3 00	20	-----	44	All.	3
Caulkers Union	San Francisco.	October 23, 1878	40	200	25 00	-----	10	35	75%	5
Coopers, journeymen (English).	San Francisco.	April, 1882	10	120	1 00	-----	25	52	All.	60
Coopers, journeymen (German)	San Francisco.	October 16, 1887	22	58	2 50	-----	60	44	95%	50
Core Makers	San Francisco.	July, 1886	24	40	2 50	-----	25	52	All.	None.
Cornice Workers	San Francisco.	July, 1886	30	50	2 50	-----	50	45	85%	None.

Candy-makers		San Francisco.	June 3, 1886	20	60	3 00	50	52	95%	10
Carpenters and Joiners, No. 47		Alameda	May 15, 1883	7	54	2 50	25	44	All.	8
Carpenters and Joiners, No. 339		Berkeley	September 18, 1887	13	23	1 00	25	40	50%	8
Carpenters and Joiners, No. 56		Grass Valley	March 11, 1884	11	907	5 00	50	36	95%	400
Carpenters and Joiners, No. 289		Los Angeles		23	52	3 00	50	32	90%	15
Carpenters and Joiners, No. 36		Monrovia	December 2, 1882	30	350	3 00	25	40	99%	50
Carpenters and Joiners, No. 312		Oakland	July, 1887	23	58	5 00	50	50	All.	5
Carpenters and Joiners, No. 303		Oceanside	July 28, 1887	18	26	3 00	50	42	50%	None.
Carpenters and Joiners, No. 195		Ontario	July 19, 1886	24	208	2 50	50	40	25%	100
Carpenters and Joiners, No. 197		Pasadena	June 23, 1887	18	60	2 50	40	44	25%	100
Carpenters and Joiners, No. 298		Pomona	January 17, 1887	31	75	5 00	50	50	90%	40
Carpenters and Joiners, No. 235		Riverside	January 29, 1882	50	700	5 00	40	36	80%	150
Carpenters and Joiners, No. 22		San Francisco	December, 1886	7	100	1 00	25	40	All.	75
Carpenters and Joiners, No. 226		Santa Barbara	June 9, 1887	7	23	2 50	50	52	95%	20
Carpenters and Joiners, No. 293		Santa Monica	September 1, 1887	39	167	2 50	50	40	All.	40
Carpenters and Joiners, No. 316		San José	September 19, 1887	11	60	1 00	50	36	80%	100
Carpenters and Joiners, No. 337		Stockton	June, 1886	41	454	5 00	50	40	50%	300
Carpenters and Joiners, No. 182		San Diego	December, 1882	21	38	2 00	25	45	All.	None.
Carpenters and Joiners, No. 35		San Rafael	September 20, 1887	20	45	1 00	50	40	All.	20
Carpenters and Joiners, No. 75		Santa Rosa		42	142	5 00	50	30	90%	10
Carpenters and Joiners, No. 282		Santa Ana	February 4, 1885	12	240	5 00	50	34	75%	60
Carpenters and Joiners, No. 86		San Bernardino	July 2, 1887	17	31	2 50	50	44	All.	13
Carpenters and Joiners, No. 300		San Buenaventura	September 22, 1887	23	58	2 50	35	40	50%	20
Carpenters and Joiners, No. 133		Santa Cruz								
Carpenters and Joiners		Sacramento								
Coast Seamen's Union		San Francisco	March 6, 1885	500	2,785	5 00	50			
Coast Seamen's Union		Port Townsend	March, 1885		95	5 00	50			
Coast Seamen's Union		Eureka	August, 1886		113	5 00	50			
Coast Seamen's Union		San Pedro	August, 1886		228	5 00	50			
Coast Seamen's Union		San Diego	June, 1887		75	5 00	50			
Draymen and Teamsters		San Francisco	1876	320		10 00	1	52	All.	900
Dry Goods Men's Association		San Francisco	September 2, 1884	30	170	2 00	50	52	95%	750
Engineers (stationary)		San Francisco	November 14, 1885	50	125	5 to 10 00	50	52	99%	200
Engineers (marine), No. 35		San Francisco	July 27, 1882	34	450	11 50	30	52	All.	30
Furniture Workers International, No. 15		San Francisco	November 19, 1885	28	105	1 00	50	44		400
Furniture Workers International, No. 25		San Francisco	March, 1886	20	75	1 00	50			
Glovers Union, Knights of Labor, No. 7,546		San Francisco	May, 1886	80	150	1 00	50	48	99%	20
Glass Blowers		San Francisco	June, 1877	15	28	5 00	60	48	All.	None.
Harnessmakers		San Francisco	May, 1886	30	60	50	25	40		250
Hat Finishers		San Francisco	February 8, 1883	25	10	3 00	25	36	All.	6
Horse-shoers		San Francisco	January 10, 1887	30	82	2 00	50	75	75%	50
Iron Molders, No. 164		San Francisco	1873	30	500	1 00	1	32	50%	None.
Iron Molders		Sacramento	April 10, 1888	33	34	3 00		50	All.	None.
Lasters		San Francisco	April 13, 1886	40	140	1 00	25	45	All.	15

TABLE K—Continued.

NAME OF ORGANIZATION.	Location.	Date of Organization.	Charter Membership	Membership at Present	Initiation	Dues—Weekly	Dues—Monthly	Number of Weeks in Year Members are Employed	Proportion of Members at Present Employed	Number Men Outside Union Eligible for Membership
Labors	San Francisco	—, 1878	70	300	\$30 00	—	\$0 25	45	All	400
Lumbermen's Protective	San Francisco	—, 1885	50	25	5 00	—	1 00	25	75	200
Longshore Lumbermen	San Francisco	—, 1880	200	230	1 00	—	—	50	30	300
Machinists	San Francisco	February 10, 1885	200	430	1 00	—	25	36	All	—
Musicians Mutual Protective	San Francisco	October, 1885	130	410	10 00	—	35	45	—	50
Painters (journeymen)	San Francisco	May, 1882	20	100	2 00	—	25	36	90%	100
Painters (resco)	San Francisco	January 24, 1885	10	10	1 00	—	25	25	94%	50
Painters, Knights of Labor, No. 3, 67	Los Angeles	April 8, 1881	25	190	5 00	—	50	42	75%	100
Painters and Decorators	San José	October 22, 1887	34	55	1 00	—	50	40	All	25
Patternmakers	San Francisco	February, 1885	80	70	2 50	—	50	45	98%	20
Plumbers and Gasfitters	San Francisco	—	50	85	5 00	—	50	45	80%	00
Plumbers and Gasfitters	San Diego	September 7, 1887	9	40	2 50	—	50	35	75%	6
Plasterers, No. 28	San Diego	December 13, 1885	8	35	10 00	—	25	50	50%	4
Plasterers	San Francisco	—, 1865	30	175	10 00	—	25	45	All	25
Plasterers	San José	—, 1887	9	20	10 00	—	25	44	All	6
Pavers	San Francisco	February 21, 1878	32	35	2 50	—	25	21	65%	—
Packers (cigar)	San Francisco	February 15, 1886	45	24	3 00	\$0 45	1 00	40	70%	15
Pressmen, No. 24	San Francisco	—	145	19	2 50	—	—	52	—	—
Pressmen, No. 26	Sacramento	—	150	300	10 00	—	25	39	75%	20
Shipwrights Association	San Francisco	—, 1868	20	80	10 00	—	25	26	All	10
Ship and Steamboat Joiners	San Francisco	—, 1882	20	80	1 00	—	30	40	99%	None
Stonecutters	Rocklin	March 10, 1887	150	250	1 50	—	50	30	All	None
Stonecutters	San Francisco	March 4, 1887	150	250	1 50	—	50	30	All	30
Stonecutters	Los Angeles	May, 1887	81	50	1 00	—	30	39	All	30
Stonecutters	Vallejo	September 15, 1887	13	24	1 00	—	30	52	All	None
Stonecutters	San José	—, 1887	8	30	1 00	—	50	45	All	None
Steamship Stevedores' Association	San Francisco	June 10, 1886	200	700	1 00	—	25	25	45%	400
Steamship Sailors	San Francisco	July, 1886	300	1,200	10 00	—	50	26	99	1,000
Tailors	San Francisco	September 21, 1873	35	255	2 00	—	25	40	All	—
Typographical, No. 21	San Francisco	—, 1872	30	620	1 00	—	60	52	—	400

Typographical, No. 46	Sacramento	June, 1880	20	85	1 00	35	45	75%	7
Typographical, No. 36	Oakland	October, 1875	15	60	3 00	75	40	85%	25
Typographical, No. 174	Los Angeles	September 14, 1886	9	212	2 00	50	45	75%	20
Typographical, No. 84	San Bernardino		14	32		50	45		3
Typographical, No. 221	San Diego	September, 1887	15	30	2 00	50	52	95%	10
Typographical, No. 231	San José	January, 1881	49	60	20 00	50	44	All.	30
Wharf Builders	San Francisco	December, 1886	40	77	2 50	50	44		12
Wood Carvers	San Francisco		10	33		50			3,000
White Cooks and Waiters	San Francisco		1,000						700
White Cooks and Waiters	Los Angeles		170						300
White Cooks and Waiters	Oakland		40						350
White Cooks and Waiters	Sacramento		35		2 00	50	30	50%	20
Upholsters (carpet)	San Francisco	November 18, 1886	48	25	2 50	25	40	All.	400
Tanners and Carriers	San Francisco	November 27, 1887	41	213					

CHAPTER II.

WAGES AND HOURS OF LABOR.

The number of hours which shall constitute a legal day's work is a question which at present engages the attention of nearly all labor organizations in the civilized world. Organized labor is loud in its demand for a reduction in the hours of labor, and unorganized labor has still stronger claims in the same direction.

The impositions heaped upon certain wage classes in the community by corporations and individuals, in compelling them to work fifteen, eighteen, and twenty hours daily, is a travesty upon the Declaration of Independence, which claims every man "born free and equal, with certain inalienable rights, among which are life, liberty, and the pursuit of happiness."

The sweets of life, liberty, or happiness are not tasted by the man who is compelled to work two thirds of the day. He is a stranger to his family, a slave to his employer, and an apology for a "free" American citizen. That the hours of labor must ultimately be reduced is evident, but at what time and how that shall be accomplished is a momentous question. It cannot be settled by strikes or boycotts. It must be remembered that we are living within the closest commercial relationship with the entire civilized world. Our ports are open to the laborers of Europe, consequently we have to contend against not only our own wage earners, but also the labor of foreigners, who are flocking to our shores.

The chief arguments in favor of a reduction in the hours of labor are:

First—That owing to the introduction of machinery whereby the production has been vastly increased, the laborer is worse off than before, because he does not receive a corresponding decrease in the hours of work, while labor has been greatly displaced.

Second—In consequence of machinery causing this supply of overproduction and the wage classes being daily thrown out of employment; if the hours were reduced it would tend to lessen this production, and necessitate a greater demand for labor.

Third—That this overproduction has a tendency to cause unrestricted competition among the laboring classes, which demoralizes trade; and if shorter hours and more men were employed, the employers, instead of being injured, would be correspondingly benefited, because there would be a greater demand for the manufactured wares.

Fourth—That this increased time of leisure would give more time to intellectual work and attention to his family.

Many occupations vary in the hours of labor during the seasons of summer and winter.

That the long hours of labor operate directly in hindering the wage classes from devoting the necessary attention to the cultivation of their social and intellectual welfare is sustained by many able writers. "That the intelligence of the working classes," says W. J. Noble, of New York, "would improve with the advantage of more leisure time, we have every reason to believe, and that political tricksters and shameless demagogues could no longer turn their ignorance to the advantage of political party power. They would then understand the causes of their evils and the remedies they ought to apply, and instead of considering machinery a detriment to labor, they would realize it as the greatest benefit to them, exactly as the elements of fire and water can be made beneficial or injurious to us just as we put ourselves in right or wrong relations to them. It has been com-

puted, says Dr. Franklin, that if every man and woman would work four hours each day on something useful, that labor would be sufficient to procure all the necessities and comforts of life; want and misery would be banished out of the world, and the rest of the twenty-four hours might be leisure and pleasure; but as Dr. Franklin computed one hundred years ago, with our present facilities, were it possible for all to perform their share of useful work, two hours would suffice."

There are many abuses, however, in the employment of labor which should be eradicated, and one of the worst is the inhuman system of compelling men and women, boys and girls, because they cannot help themselves, to toil both day and night for a scanty living. This evil can be seen in the employment of street car conductors and drivers probably more than in any other departments of labor. Barbers, butchers, waiters, clerks, saleswomen, seamstresses, telegraph and messenger boys, work during long, unseasonable hours. It should not be tolerated that corporations or individuals should work their employes more than twelve hours in the twenty-four. The system is inhuman, and conducive to disease and premature death. The following table will show some of the occupations in which twelve and more hours of labor per day are required, and the remuneration received in San Francisco:

TABLE L.
Wages and Hours of Labor of Unorganized Toilers.

OCCUPATION.	Hours.	Average Daily Wages.
Barbers	14	\$2 00
Bakers	14	2 00
Bartenders	12	2 50
Brewers	12	2 00
Brewers (cellarmen)	12	1 50
Brewers (washers)	12	1 50
Butchers	14	2 00
Car conductors	13	2 00
Car drivers	13	2 50
Car gripmen	13	2 50
Confectioners	12	2 00
Clerks in small retail stores	12	2 50
Dairymen	12	1 00
Distillers	12	1 50
Druggists	16	2 00
Engineers (marine)	12	3 25
Firemen (marine)	12	1 50
Firemen (stationary)	12	2 00
Gas house men	12	2 50
Hack drivers	12	1 75
Herders	14	1 50
Hostlers	14	1 50
Laundry (men)	14	1 50
Laundry (women)	14	1 00
Millers	12	5 00
Maltmen	12	3 00
Paper makers (men)	12	1 50
Paper makers (boys)	12	1 00

It will be observed that the foregoing are classes that are unorganized. The efficacy of organization, therefore, can be better appreciated when it is seen that all combined labor regulates, to a great extent, the hours of work and commands better wages. The following table gives the hours of work and wages of organized labor in San Francisco:

TABLE M.

Organized Trades and Labor Unions in San Francisco—Hours of Labor and Daily Wages.

NAME OF ORGANIZATION.	Hours.	Average Daily Wages.	
Boot and Shoemakers W. L. L.	10	\$2 00	Piece work.
Bricklayers of San Francisco	9	5 00	Time work.
Bag and Satchel Makers	10	2 00	Time work.
Boilermakers and Iron Ship Builders	*10	3 50	Time work.
Beer Brewers and Malsters Union	10	3 00	Time work.
Barbers Protective	12	3 00	Time work.
Caulkers Association	9	5 00	Time work.
Coopers, Journeymen (English)	10	3 25	Piece work.
Coremakers	10	3 25	Time work.
Cornicemakers, Galvanized Iron	9	5 00	Time work.
Candymakers	10	3 00	Time work.
Draymen and Teamsters	11	2 50	Time work.
Engineers, Stationary	11	3 00	Time work.
Engineers, Marine	10	5 00	Time work.
Glovers	9	3 50	Piece and time.
Glassblowers	8	5 00	Piece work.
Hat Finishers	optional	4 50	Piece work.
Horse-shoers	10	3 50	Time work.
Iron Molders	10	4 00	Time work.
Lasters Protective	9	3 00	Piece work.
Laborers	†8 and 9	{ 3 00 and 3 50 }	Time work.
Lumbermen's Protective	9	4 00	.75 cents per hour overtime.
Longshore Lumbermen	9	4 00	Time work.
Machinists	10	3 25	Time work.
Painters	9	3 00	Time work.
Patternmakers	10	3 50	Time work.
Plumbers, Journeymen	9	3 25	Time work.
Plasterers, Journeymen	8	5 00	Time work.
Pavers	9	4 00	Time work.
Painters, Fresco	9	4 00	Time work.
Packers, Cigar	8	2 75	Time work.
Shipwrights Association	9	4 00	Time work.
Ship and Steamboat Joiners	9	4 00	Time work.
Stonecutters, Journeymen	9	4 00	Time work.
Steamship Stevedores	9	4 00	.30 cents per hour overtime.
Tailors Protective	10	3 00	Time and piece.
Wharf Builders	9	3 50	Time work.
Upholsterers, Carpet	10	3 50	Time work.

* Ten hours in the shop; nine on the outside.

† Plasterers' laborers work eight hours for \$3 50 per day; bricklayers, nine hours for \$3.

TABLE N.
Wages and Hours of Employment.

OCCUPATION.	PER HOUR.			PER DAY.			PER WEEK.			PER MONTH.			Hours.
	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	
Acid-makers				\$3 00	\$2 00	\$2 20	\$17 50	\$12 00	\$13 20				10
Agricultural implement works				5 00	2 00	2 50							10
Artificial flower makers (men)							9 00	6 00	9 00				10
Artificial flower makers (women)							7 00	3 00	5 00				8½
Artists on stained glass (men)				10 00	5 00								8½
Asphaltum workers				3 50	2 50	3 00							9
Assayers										\$150 00	\$40 00	\$75 00	8
Awning-makers (men)							18 00	9 00	12 00				
Axlegrease-makers (men)							15 00	12 00					10
Axlegrease-makers (boys)							8 00	7 00	7 50				10
Bag-makers, cotton (men)							15 00	9 00	12 00				10
Bag-makers, cotton (girls and women)							7 00	3 00	5 00				10
Bag-makers, cotton (boys)							5 00	3 00	4 00				10
Bag-makers, paper (men)							26 00	12 00	12 00				10
Bag-makers, paper (boys)							7 00	5 00	6 00				10
Bag and satchel makers				3 50	2 00	3 00							9
Bakers										*75 00	*40 00	*50 00	14
Bakers, cracker				3 00	2 50	2 50							9
Ballastmen				\$0 30		3 00							10
Barbers							15 00	10 00	12 00				12
Bartenders										100 00	40 00	50 00	14
Basket-makers				2 50	2 00	2 00							10
Bedspring-makers				2 00	1 00	1 50							10
Bell hangers				4 00	2 00	3 00	24 00	12 00	18 00				10
Belting-makers, leather							20 00	12 00	15 00				10
Billiard table makers				3 50	1 50	2 75							
Blacking-makers (men)							15 00	6 00	12 00				9
Blacking-makers (boys)							6 00	3 00	4 50				9
Blacksmiths				3 50	3 00								10
Blacksmiths (helpers)							12 00	5 00	7 50				10
Bleachers (oil)										75 00	75 00	75 00	10
Boat builders							21 00	18 00	21 00				9

*And found.

TABLE N—Continued.

OCCUPATION.	PER HOUR.			PER DAY.			PER WEEK.			PER MONTH.			Hours.
	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	
Boatmen.....												\$20 00	10
Boiler-makers.....				\$4 25	\$3 00	\$3 25			\$15 00	\$18 00			10
Bookbinders.....							\$24 00		\$15 00	\$18 00			10
Bookbinders (apprentices).....							12 00		3 00	9 00			10
Bookfolders (girls and women).....							10 00		5 00	6 00			9
Bookkeepers.....											\$200 00	\$40 00	9
Boot and shoe makers.....							15 00		10 00	12 00			10
Box-makers, cigar (men).....				3 00	2 00	2 50							10
Box-makers, cigar (women).....							9 00		6 00	7 50			10
Box-makers, cigar (boys).....							10 00		3 00	7 50			10
Box-makers, jewelry and fancy (men).....							21 00		10 00	15 00			10
Box-makers, jewelry and fancy (girls and women).....							6 00		4 00	5 00			10
Box-makers, jewelry and fancy (boys).....							5 00		3 00	4 00			10
Box-makers, packing (men).....							15 00		10 00	12 00			10
Box-makers, paper (men).....				2 50	2 50	2 50							10
Box-makers, paper (women and girls).....							9 00		3 00	5 00			10
Box-makers, paper (boys).....							6 00		4 50	5 00			10
Brass finishers.....				3 50	2 50	3 00							10
Brass molders.....													10
Brass spinners.....				3 00	2 00	2 50							10
Brewers.....											90 00	50 00	12
Brewers (cellarmen).....													12
Brewers (washers).....											60 00	50 00	12
Brick-burners.....											*35 00	*30 00	9
Brick-makers.....											*35 00	*30 00	9
Bricklayers.....				5 50	5 00	5 00							9
Broom-makers (men).....				2 00	1 50	1 75							10
Broom-makers (women and girls).....							9 00		6 00	7 00			9½
Broom-makers (women and girls).....							9 00		6 00	7 00			10
Broom-makers (boys).....							21 00		10 00	15 00			9
Brush-makers (men).....							9 00		6 00	7 00			9½
Brush-makers (women and girls).....							9 00		6 00	7 00			9½
Brush-makers (boys).....							7 50		5 00	6 00			10 to 14
Butchers.....											125 00	50 00	12
Cabinet-makers.....				3 50	2 50	3 00					75 00	40 00	50 00
Calkers.....				5 00	4 00	4 50							9 to 10

Candle-makers					15 00	12 00	13 50					10
Candy-makers (men)					8 00	3 50	5 50					10
Candy-makers (women and girls)					10 00	3 00	7 00					10
Candy-makers (boys)					21 00	9 00	13 00					10
Can-makers (men)					8 00	5 00	6 00					10
Can-makers (women and girls)					8 00	5 00	6 00					10
Can-makers (boys)					20 00	9 00	12 00					10
Cannery (men)					7 00	4 50	5 00					10
Cannery (women and girls)					5 00	4 50	5 00					10
Cannery (boys)					2 00							13
Car conductors					2 25	2 00						13
Car drivers				2 70	2 50	2 50						13
Car grimmen												10
Cards					32 00		25 00					10
Carpenters				4 00	2 50	3 50						9
Carpenters, ship and steamboat				5 00	4 00	4 50						9
Carpet beaters				3 00	2 25	2 50						10
Carpet layers				4 00	3 50	3 50	15 00	20 00				10
Carpet sewers (men)				2 00	1 00	1 50	24 00					9
Carpet sewers (women)							10 00	3 00				9
Carpet weavers							20 00	10 00	15 00			10
Carriage-makers				5 00	2 25	3 00						10
Carriage painters				4 00	2 00	3 00						10
Carriage trimmers				3 50	2 00	3 00						10
Carvers, furniture				4 50	4 00	4 50						9
Carvers, marble				6 00	4 00	5 00						9
Carvers, stone				6 00	4 00							9
Carvers, wood				\$0 30								9
Catchers				3 00	2 00	2 50						10
Cement-makers							60 00	45 00	50 00			10
Chair-caners (women)							3 00	6 00				10
Chair-caners (boys)							3 50	6 00				10
Charcoal burners												10
Chemists												8
Chocolate-makers							130 00	40 00	75 00			8
Cigar-makers							20 00	14 00	16 00			10
Cigar packers							15 00	10 00	11 00			10
Clerks, retail stores				6 00	2 00	2 50	15 00	12 00	15 00			12
Clock-makers (men)							25 00	10 00	15 00			9
Clock-makers (women)							9 00	3 00	7 50			9
Coffee and spice mills (men)							20 00	14 00	16 00			10
Coffee and spice mills (women and girls)							6 00	4 00	6 00			10
Coffee and spice mills (boys)							9 00	7 00	8 00			10

* And found.

TABLE N—Continued.

OCCUPATION.	PER HOUR.			PER DAY.			PER WEEK.			PER MONTH.			HOURS.
	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	
Compositors									\$15 00	\$100 00	\$40 00	\$40 00	10
Confectioners													12
Cooks (men)										\$100 00	\$30 00	\$75 00	11
Cooks (women)										\$25 00	\$20 00	\$25 00	16
Coopers							\$21 00	\$15 00	18 00				10
Coopers (apprentices)							10 00	5 00	7 50				10
Coppersmiths				\$3 75	\$2 25	\$3 00							9
Copiersmiths				4 00	1 00	2 50							10
Copyists				2 75	2 00	2 50							10
Cotton loom fixers													10
Cotton mills (men)							20 00	9 00	12 00				10
Cotton mills (women)							10 00	6 00	7 50				10
Cotton mills (boys and girls)							6 00	3 60	4 80				10
Cotton pickers									12 00				10
Cotton weavers							18 00	11 00	13 00				10
Cordage works (men)	\$0 37 $\frac{1}{2}$	\$0 17 $\frac{1}{2}$	\$0 17 $\frac{1}{2}$										10
Cordage works (boys)	12 $\frac{1}{2}$	12 $\frac{1}{2}$	12 $\frac{1}{2}$										10
Cracker bakers													9
Cracker bakery (men)				3 00	1 50	2 50							9
Cracker bakery (women and girls)							10 50	4 50	7 50				9
Cracker bakery (boys)							10 00	4 50	7 50				9
Cream tartar refiners							12 00	10 00	11 00				9
Curriers							18 00	12 00	15 00				10
Cutlers							24 00	18 00	18 00				10
Dairymen										\$40 00	\$25 00	\$25 00	12
Demijohn coverers							12 00	7 00	8 50				10
Distillers										150 00	40 00	50 00	12
Draughtsmen, architectural										100 00	30 00	50 00	8
Draughtsmen, mechanical				5 00	3 00	3 25							9
Draymen							15 00	12 00	15 00				11
Dress-makers				2 50	1 00	1 50							10
Dress-makers (apprentices)†							6 00	3 00	4 00				10
Drivers													16
Druggists										100 00	30 00	60 00	8 $\frac{1}{2}$
Druggists, manufacturing										125 00	60 00	80 00	10
Dyers							35 00	12 00	21 00				10
Electrotypers							21 00	10 00	15 00				10

Engineers, civil	10 00	5 00	7 50																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
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*And found.

† Many work from three to six months for nothing.

† One share to each man and one share to boat.

TABLE N—Continued.

OCCUPATION.	PER HOUR.			PER DAY.			PER WEEK.			PER MONTH.			Hours.
	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	
Glove-cutters (men).....							\$18 00	\$12 00	\$16 50				9 1/2
Glove-makers (women).....							12 00	6 00	7 50				10 1/2
Gold and silver platers.....							20 00	14 00	15 00				9
Gold and silver platers (apprentices).....									8 00				9
Gold beaters.....							14 00	9 00	11 00				9 1/2
Grainers.....						\$5 00							8
Grainers (helpers).....						2 50							8
Granite-cutters.....				\$4 50	\$2 50	3 50							10
Grinders.....				4 00	3 50	4 00	30 00	18 00	18 00				10
Grinders, saw.....							21 00	15 00	18 00				9 1/2
Gunsmiths.....				2 00	1 50	1 75	25 00	15 00	20 00	\$10 00	\$5 00	\$52 50	12
Hack drivers.....							15 00	5 00	10 00				9
Hairdressers (men).....							25 00	15 00	20 00				9
Hairdressers (women).....							20 00	5 00	8 00				9
Hair workers (men).....							20 00	10 00	13 50				10
Hair workers (women).....							10 00	5 00	7 50				10
Harness-makers.....							18 00	7 50	10 00				9
Harness-makers (apprentices).....							9 00	4 50	7 50				9
Hat and cap makers (men).....							52 00	25 00	30 00				10
Hat and cap makers (women).....							18 00	6 00	10 00				9
Hatters.....							17 00	10 00	15 00			50 00	10
Hatters' trimmers (women).....													10 to 14
Heaters.....													9
Herders.....						3 00							8
Hod carriers, bricklayers'.....						3 50							10
Hod carriers, plasterers'.....				3 00	2 00	2 50							10
Hookers.....				3 00	2 00	2 25							10
Horse collar makers.....				4 00	3 00	3 50							10
Horseshoers.....							35 00	18 00	26 00				10
Hosiery and underwear factory (men).....							15 00	3 00	6 00				10
Hosiery and underwear factory (women).....							6 50	3 00	6 00				10
Hosiery and underwear factory (boys).....										60 00	30 00	50 00	14
Hostlers.....							15 00	12 00	12 00				10
Ink and mucilage makers.....													10
Iron chippers.....						2 50							10
Iron molders.....						3 25							10

TABLE N—Continued.

OCCUPATION.	PER HOUR.			PER DAY.			PER WEEK.			PER MONTH.			HOURS.
	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	
Miners, asphaltum.....	-----	-----	-----	\$2 50	\$2 00	-----	-----	-----	-----	-----	-----	-----	-----
Miners, coal.....	-----	-----	-----	2 75	2 25	-----	-----	-----	-----	-----	-----	-----	-----
Miners, gold, hydraulic.....	-----	-----	-----	3 00	2 50	-----	-----	-----	-----	-----	-----	-----	-----
Miners, gold, placer.....	-----	-----	-----	3 00	2 50	-----	-----	-----	-----	-----	-----	-----	-----
Miners, gold, quartz.....	-----	-----	-----	3 00	2 50	-----	-----	-----	-----	-----	-----	-----	-----
Miners, granite.....	-----	-----	-----	2 50	2 00	-----	-----	-----	-----	-----	-----	-----	-----
Miners, gravel.....	-----	-----	-----	3 00	2 50	-----	-----	-----	-----	-----	-----	-----	-----
Miners, iron.....	-----	-----	-----	3 00	2 50	-----	-----	-----	-----	-----	-----	-----	-----
Miners, marble.....	-----	-----	-----	2 50	2 00	-----	-----	-----	-----	-----	-----	-----	-----
Miners, quicksilver.....	-----	-----	-----	4 00	3 00	-----	-----	-----	-----	-----	-----	-----	-----
Miners, silver.....	-----	-----	-----	3 00	2 50	-----	-----	-----	-----	-----	-----	-----	-----
Mirror polishers.....	-----	-----	-----	-----	-----	-----	\$12 00	\$10 00	\$10 00	\$80 00	\$50 00	\$40 00	10
Mirror silvers.....	-----	-----	-----	-----	-----	-----	20 00	12 00	15 00	-----	-----	-----	10
Model-makers.....	-----	-----	-----	4 00	3 50	\$3 50	-----	-----	-----	-----	-----	-----	9
Molders, brass.....	-----	-----	-----	-----	-----	3 00	-----	-----	-----	-----	-----	-----	10
Molders, iron.....	-----	-----	-----	3 50	3 25	3 25	-----	-----	-----	-----	-----	-----	10
Nailers.....	-----	-----	-----	9 00	3 50	7 00	-----	-----	-----	-----	-----	-----	10
Netters (men).....	-----	-----	-----	-----	-----	-----	-----	25 00	-----	-----	-----	-----	10
Nurserymen.....	-----	-----	-----	3 50	2 50	3 00	-----	-----	-----	-----	-----	-----	10
Oil bleachers.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	75 00	10
Oil boilers.....	-----	-----	-----	3 25	2 25	-----	-----	-----	-----	-----	-----	-----	10
Oil pressers.....	-----	-----	-----	-----	-----	2 25	-----	-----	-----	-----	-----	-----	-----
Oil refiners.....	-----	-----	-----	3 25	2 25	3 00	-----	-----	-----	\$85 00	\$30 00	\$40 00	10
Oyster men.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	9
Painters.....	-----	-----	-----	3 00	2 00	3 00	-----	-----	-----	-----	-----	-----	10
Painters, carriage.....	-----	-----	-----	4 00	2 00	3 00	-----	-----	-----	-----	-----	-----	8
Painters, fresco.....	-----	-----	-----	10 00	3 00	6 00	-----	-----	-----	-----	-----	-----	8
Painters, sign and ornamental.....	-----	-----	-----	6 00	4 00	5 00	-----	-----	-----	-----	-----	-----	9
Paper hangers.....	-----	-----	-----	4 00	2 50	3 00	24 00	15 00	18 00	-----	-----	-----	12
Paper-makers (men).....	-----	-----	-----	-----	-----	-----	-----	-----	-----	100 00	30 00	50 00	12
Paper-makers (boys).....	-----	-----	-----	-----	-----	-----	-----	-----	-----	30 00	25 00	30 00	12
Paper rulers.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	10
Pattern-makers.....	-----	-----	-----	-----	-----	-----	24 00	15 00	18 00	-----	-----	-----	9
Pavers.....	-----	-----	-----	4 00	3 25	3 50	-----	-----	-----	-----	-----	-----	10
Photographic operators.....	-----	-----	-----	4 00	4 00	4 00	35 00	15 00	25 00	-----	-----	-----	7 to 8
Photographic printers.....	-----	-----	-----	-----	-----	-----	25 00	15 00	20 00	-----	-----	-----	7

TABLE N—Continued.

OCCUPATION.	PER HOUR.			PER DAY.			PER WEEK.			PER MONTH.			Hours.
	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	
Servants (women)-----				\$3 00	\$2 00	\$2 50				\$35 00	\$15 00	\$20 00	10
Sewer builders-----							\$8 50	\$2 50	\$6 00				9
Sewing machine operators (women)-----				4 50	2 50	3 00							9
Sheet iron workers-----				4 50	3 00	3 50							9
Sheet iron workers, galvanized-----				5 00	4 00	4 50	27 00	18 00	21 00				9
Ship and steamboat carpenters-----				5 00	4 00	4 50							9
Ship and steamboat joiners-----				5 00	4 00	4 50							9
Shipsmiths-----				4 25	3 00	3 25							9
Shipwrights-----				5 00	4 00	4 50							9
Shoe-makers-----							15 00	10 00	12 00				10
Shoe-makers (apprentices)-----													10
Shot-makers-----				4 00	3 00	3 00	30 00	18 00	18 00				10
Showcase-makers-----							24 00	15 00	18 00				10
Silversmiths-----							9 00	3 00	6 00				10
Silversmiths (apprentices)-----													10
Spinners, cotton-----							7 50	6 00	7 00				10
Spinners, cotton (women, girls, and boys)-----													10
Spinners, brass-----													10
Spinners, jute (men)-----				3 00	2 00	2 50							10
Spinners, jute (women, girls, and boys)-----													10
Spool silk factory employes (men)-----							7 50		7 50			100 00	10
Spool silk factory employes (women and girls)-----										125 00			10
Spool silk factory employes (boys)-----													10
Soap-makers-----							9 00	3 60	6 00				10
Soap packers (boys and girls)-----							6 00	3 00	3 75				10
Soda works employes-----							15 00	12 00	13 50				10
Soda works employes-----							9 00	7 50	8 00				10
Stainers, glass-----				10 00	5 00								8
Stair builders-----				5 00	3 00	3 50							9
Stair builders-----				4 00	3 50	3 50							9
Steam fitters-----				4 50	2 50	3 50							9
Steamship men-----													
Stereotypers-----							20 00	12 00	15 00	70 00	25 00		10
Stevadores-----			\$0 55			5 00							9
Stocking-makers (women and girls)-----													10
Stone carvers-----				6 00	4 00	5 00							9
Stone-cutters-----				4 50	2 50	3 50							9
Stone letterers-----				4 00		4 00							9

[illegible]

* And found.

TABLE N—Continued.

OCCUPATION.	PER HOUR.			PER DAY.			PER WEEK.			PER MONTH.			HOURS.
	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	
Weavers, carpet.....							\$20 00	\$10 00	\$15 00				10
Weavers, cotton (men, women, girls, and boys)							11 00	6 00	7 50				10
Weavers, jute (women, girls, and boys).....							7 50	4 00	6 00				10
Well borers, artesian.....													10
Wheelwrights.....				\$5 00	\$3 00	\$3 50							10
White lead makers (men).....				5 00	2 25	3 00							10
White lead makers (boys).....				2 50	1 50	2 00				\$30 00	\$20 00	\$25 00	10
Whiteners.....				3 50	2 50	3 00							9
Wire-makers.....										150 00	65 00	75 00	9 to 10
Wire (barb) fence makers.....													10
Wire cleaners.....							12 00	10 00	11 00				10
Wire drawers.....							18 00	15 00	17 50				10
Wire rope makers.....													10
Wire weavers.....							21 00	15 00	18 00				10
Wire workers.....							18 00	12 00	13 00				10
Wood carvers.....			\$0 30			3 00							9
Wood carvers, furniture.....				4 50	4 00	4 50							9
Wood cutters.....										65 00	25 00	30 00	10
Wood engravers.....				5 00	2 00	3 50							8
Wooden ware workers.....							15 00	7 50	10 00				10
Woolen mill employes (men).....							41 50	9 00	15 00				11
Woolen mill employes (women).....							12 50	6 00	9 00				11
Woolen mill employes (boys).....							6 00	4 50	5 00				11
Wool graders.....				4 00	2 50	3 00				125 00	100 00	100 00	10
Wool scourers.....				3 00	1 50	2 25	20 00		20 00				10
Wool sorters.....						2 50							10

TABLE N 2—Continued.

STATES AND COUNTRIES.

INDUSTRIES.

INDUSTRIES.	California	New York	Illinois (Chicago)	Pennsylvania	Maine	Germany	France	Belgium	Italy	England and Wales	Switzerland	Denmark	Scotland	Ireland	Canada (Ottawa)	Hawaiian Island
Dyers	\$15 00	\$13 00	\$16 50	\$8 88	---	\$3 45	\$4 83	\$6 15	\$3 60	\$6 18	\$4 91	\$4 29	\$5 56	\$4 86	\$7 00	---
Engravers	---	16 00	24 00	---	---	5 12	7 35	6 42	6 00	8 38	6 35	8 00	7 29	8 27	15 00	\$19 00
Furriers*	7 to 12	10 00	15 00	---	---	4 20	7 00	6 35	4 00	8 52	4 63	5 36	7 50	8 02	14 00	---
Gardeners	18 00	9 00	12 00	---	---	3 78	5 11	3 91	4 00	5 80	3 83	4 00	4 86	4 86	8 00	---
Hatters	24 00	13 00	21 00	15 00	---	4 36	5 50	4 06	5 20	6 10	3 81	---	7 29	7 30	12 00	---
Horseshoers	21 00	13 00	18 00	---	---	3 61	5 89	5 62	5 20	6 35	4 65	4 82	6 80	6 21	12 00	24 00
Jewelers	20 00	11 00	13 50	---	---	5 21	6 24	6 84	3 80	8 76	6 35	5 36	6 56	8 00	12 00	12 00
Laborers (plasterers)	18 00	10 00	15 00	9 00	---	2 91	3 23	3 02	1 70	5 27	3 40	3 86	4 65	3 53	13 50	12 00
Hod carriers	18 00	11 00	10 50	8 00	\$8 40	2 92	3 13	3 23	1 70	4 94	2 99	4 30	4 65	3 40	8 40	11 00
Masons	18 00	10 00	10 50	7 50	---	3 15	3 23	3 09	1 70	5 07	3 50	4 29	4 65	3 65	8 40	11 00
Strikers (blacksmiths)	18 00	9 00	10 50	7 00	---	2 94	4 72	3 29	3 40	5 30	4 43	4 82	4 63	3 79	7 00	17 50
Plumbers' assistants†	---	---	15 70	6 00	---	2 72	3 61	2 93	1 70	4 69	3 51	5 50	4 86	3 38	8 40	10 50
Lithographers	25 00	12 00	---	---	---	5 59	7 07	5 85	---	7 07	5 51	---	7 53	7 71	12 00	---
Millwrights	24 00	14 00	30 00	---	---	4 18	6 74	5 00	---	6 97	6 30	6 00	7 41	7 30	12 00	---
Machinists	20 00	10 00	---	---	15 00	4 60	4 60	---	---	---	4 82	4 00	---	7 79	12 00	---
Potters	15 00	10 00	---	12 00	---	3 60	4 78	4 86	5 20	5 20	5 76	4 02	---	4 38	---	---
Printers	20 00	13 00	---	12 00	9 00	---	6 64	5 94	4 60	7 17	5 93	5 36	---	8 52	11 00	25 00
Pattern-makers	21 00	12 00	15 00	---	---	---	7 00	7 74	5 00	9 00	---	---	7 89	8 52	---	31 00
Teachers (male)	19 99	13 00	35 00	---	7 50	---	---	---	---	---	---	---	7 41	7 79	6 00	23 00
Teachers (female)	16 03	---	11 00	---	---	---	---	---	---	---	---	---	18 69	8 52	3 00	---
Saddle and harness	13 50	11 00	15 00	12 50	12 00	3 69	5 70	5 51	2 80	7 02	5 20	5 00	5 58	6 15	7 00	19 05
Sail-makers	18 00	12 00	15 00	---	---	2 85	6 04	4 56	2 00	6 38	---	---	4 82	6 08	---	---
Stevardores	24 00	12 00	18 00	---	---	5 70	6 72	4 36	2 00	8 44	---	---	5 00	4 12	---	12 00
Tanners	12 00	---	15 00	9 00	---	4 00	5 18	5 81	2 20	6 38	4 92	5 09	6 80	5 45	8 25	---
Tailors	18 00	12 00	15 00	---	---	4 30	5 02	5 38	7 40	7 40	6 36	6 36	7 77	6 90	21 50	---
Telegraph operators	15 00	---	19 00	---	---	5 12	6 92	6 35	5 20	7 65	---	---	13 00	8 87	8 50	---
Tinsmiths	15 00	11 00	12 00	---	13 50	3 55	5 46	4 40	6 60	6 56	4 40	6 70	6 56	6 04	8 00	18 00

* Men and women. † Boys.

CHAPTER III.

STRIKES.

A strike at best is not the proper way to adjust the differences that arise from time to time between capital and labor. Such differences should be subjects for calm and dispassionate deliberation. The defeat of the engineers in their late strike against the Chicago, Burlington, and Quincy Railroad, is the hardest blow organized labor has received for many years, and under which it still reels. The Brotherhood of Locomotive Engineers was looked upon as a model organization by every body of laborers in the country. They were regarded as not only strong enough to overcome all obstacles, but, at the same time, were considered so conservative, that with a leader, who had never before failed in bringing about an amicable settlement, when a strike would occur, it was as though the engineers could not lose. That this was a mistaken view the sequel shows, and when this is coupled with the fact that no important strike within the last two years has been successful, while they have cost millions of dollars, it must be conceded that strikes do not pay. According to the report of the Labor Commissioner of New York, fifty thousand workmen engaged in strikes during 1887, in that State. They gained \$944,000 in advanced wages, but lost over \$2,000,000 while out of employment. The net result was a loss of over \$1,000,000. Furthermore, in his report of 1886, he says: "It is a noticeable fact that nearly all the great strikes of the year, and particularly those which have resulted in a defeat, entailing an enormous loss of wages and great misery, were managed by irresponsible committees, who knew little or nothing of the trade affected, and who forced their services upon the strikers. Frequently these committees had several strikes on their hands at the same time, and certainly could give neither time nor attention to the consideration of matters fraught with so much peril." Where strikes and boycotts are due to the excessive zeal of the officers and walking delegates, in enforcing arbitrary rules against the employment of any but members of their union, in demanding the discharge or reinstatement of this or that man, the public are not disposed to regard such strike or boycott as entitled to the sympathy which would be extended in cases where the workmen were endeavoring to secure a reasonable advance of wages, or resisting a proposed reduction. It should be borne in mind by the officers of such union, that where they make themselves amenable to the law, the organization to which they belong is in the light of being an enemy to social order, and an obstruction to legitimate enterprise. The experienced leaders of the labor movement have recognized this, and have counseled conciliatory methods calculated to remove rather than intensify public prejudice. It is to be hoped that the injurious results of provoking legal prosecutions will convince unthinking enthusiasts of the folly of disregarding counsel, and precipitating needless conflicts with employers. It is well understood by those who have access to the opinions of the public outside of the unions, that the frequent recurrence of an uncalled for and unjustifiable boycott or strike, will do more to loosen the rivets of public sympathy, and injure the cause of labor, than all other causes combined. It should be understood, and seriously considered, by those who are in any way connected with the management of an organization, that the proper way is to conciliate, not to coerce; to build up, not to tear down; to unite for justice, not to conspire to injure.

They would thus help materially to undo much of the mischief done

the cause by disturbers and revolutionists, and remove the prejudices now operating to their serious disadvantage.

STRIKES IN THE UNITED STATES.

The third annual report of the United States Bureau of Labor, Carroll D. Wright, Commissioner, covers about twelve hundred pages, and gives the details of each strike and lockout occurring in the United States during a period of six years. It exhibits the facts belonging to each industrial trouble for each locality where trouble was found, without attempting to establish or decide upon the connections between them.

The following table shows the number of strikes occurring during each of the last six years, the number of establishments involved, and the average number of establishments involved in each strike:

YEARS.	Strikes -----	Establishments Involved -----	Average Number Establishments Involved -----
1881	471	2,928	6.2
1882	454	2,105	4.6
1883	478	2,759	5.8
1884	443	2,367	5.3
1885	645	2,284	3.5
1886	1,412	9,893	7.0
Totals	3,903	22,336	5.7

In 1887, the report says there were, according to the best information obtainable, eight hundred and fifty-three strikes, details of which are not available.

The report shows that during the six years covered by the investigation New York had the largest number of establishments affected both by strikes and lockouts, there being for the former nine thousand two hundred and forty-seven, and for the latter one thousand five hundred and twenty-eight. The building trades furnished six thousand and seventy-five of the total number of establishments engaged in strikes. The total number of employes involved in the whole number of strikes for the entire period is shown to have been one million three hundred and twenty-three thousand two hundred and three. The number of employes originating the strikes was one million twenty thousand one hundred and fifty-six. The number of employes in all establishments before the strikes occurred was one million six hundred and sixty thousand eight hundred and thirty-five, while the whole number employed in the establishments involved after the strikes occurred was one million six hundred and thirty-five thousand and forty-seven, a loss of twenty-five thousand seven hundred and eighty-eight. There were one hundred and three thousand and thirty-eight new employes engaged after the strikes, and thirty-seven thousand four hundred and eighty-three were brought from other places than those in which the strikes occurred.

In two thousand two hundred and fourteen establishments lockouts were ordered during the period named. In these there were one hundred and seventy-five thousand two hundred and seventy employes before the lockouts occurred, and one hundred and seventy thousand seven hundred and forty-seven after the lockouts, while the number actually locked out was

one hundred and sixty thousand eight hundred and twenty-three. There were thirteen thousand nine hundred and seventy-six new employes secured at the close of lockouts, and five thousand six hundred and eighty-two were brought from other places than those in which the lockouts occurred. "It should be remembered, however," says the report, "that these figures do not represent the actual number of individual establishments or different employes engaged, as in many cases there have been two or more strikes or lockouts affecting the same establishment in the same year. In such cases the establishments and the number of employes engaged are duplicated."

Of the whole number of employes involved in strikes during the six years covered by the report, 88.42 per cent were males and 11.58 per cent were females. Of those involved in lockouts during the same period, 69.02 per cent were males, and 31.98 per cent were females. New York, Pennsylvania, Massachusetts, Ohio, and Illinois represent 74.84 per cent of the whole number of establishments affected by strikes throughout the country and 89.48 per cent of the lockouts. These five States, it is stated, contain 49 per cent of all the manufacturing establishments, and employ 58 per cent of the capital invested in mechanical industries of the United States.

Of the twenty-two thousand three hundred and four establishments in which strikes occurred, eighteen thousand three hundred and forty-two strikes, or 82.24 per cent of the whole, were ordered by labor organizations; while of the two thousand two hundred and fourteen establishments in which lockouts occurred, one thousand seven hundred and fifty-three, or 79.18 per cent, were ordered by combinations of managers. Of the whole number of establishments subjected to strikes there were temporarily closed for business thirteen thousand four hundred and eleven, or 60.13 per cent; on account of lockouts, 63.23 per cent. The average duration of stoppage on account of strikes was 23 days; for lockouts, 28.4 days.

The results of the strikes, so far as gaining the objects sought are concerned, are shown to be as follows: Success followed in ten thousand three hundred and seventy-five cases, or 46.52 per cent of the whole; partial success in three thousand and four, or 13.45 per cent of the whole; and failure followed in eight thousand nine hundred and ten cases, or 39.95 per cent of the whole. By lockouts five hundred and sixty-four establishments, or 25.47 per cent of the whole, succeeded in gaining their point; one hundred and ninety, or 8.58 per cent, partly succeeded; and one thousand three hundred and thirty-nine, or 60.48 per cent, failed.

As to causes or objects of strikes, it is shown that increase of wages was the principal one—42.32 per cent. The other leading causes are given as follows: For reduction of hours, 19.48 per cent; against reduction of wages, 7.77 per cent; for increase of wages and reduction of hours, 7.59 per cent; against increase of hours, .62 per cent. Total for the five leading causes, 80.75 per cent; all other causes, 19.25 per cent.

Disclaiming absolute accuracy, the report gives the losses of employes and employers resulting from strikes and lockouts as follows: Loss to strikers during the six years covered by the investigations, \$51,814,723; loss to employes through lockouts for the same period, \$8,157,717; or a total wage loss to employes of \$59,972,440. This loss occurred for both strikes and lockouts in twenty-four thousand five hundred and eighteen establishments; or an average loss of \$2,446 to each establishment, or of nearly \$40 to each striker involved. The assistance given to strikers for the same period, so far as ascertainable, amounted to \$3,324,557; to those suffering from lockouts, \$1,106,038; or a total of \$4,430,594. These amounts, how-

ever, the Commissioner says, are undoubtedly too low. The employers' losses through strikes for the six years amounted to \$30,701,553; through lockouts, \$3,452,261; or a total loss to the establishments involved of \$34,163,814.

The chief burden of strikes was borne by thirteen industries, viz.: Boots and shoes, three hundred and fifty-two establishments; brickmaking, four hundred and seventy-eight; building trades, six thousand and seventy-five; clothing, one thousand seven hundred and twenty-eight; cooperage, four hundred and eighty-four; food preparations, one thousand four hundred and nineteen; furniture, four hundred and ninety-one; lumber, three hundred and ninety-five; metals and metallic goods, one thousand five hundred and seventy; mining, two thousand and sixty; stone, four hundred and sixty-eight; tobacco, two thousand nine hundred and fifty-nine; transportation, one thousand four hundred and seventy-eight. These represent 89.48 per cent of the whole number subjected to strikes.

In lockouts five industries bore 79.54 per cent of the whole burden, as follows: Boots and shoes, one hundred and fifty-five establishments; building trades, five hundred and thirty-one; clothing, seven hundred and seventy-three; metals and metallic goods, seventy-six; and tobacco, two hundred and twenty-six; or a total of one thousand seven hundred and sixty-one.

Strikes are not generally successful as a means of settling the differences that arise between employers and employes. The statistics of European countries bear out this assertion. In the ten years from the beginning of 1870 to the end of 1879, the number of strikes, of which there is any record, is two thousand three hundred and fifty-two, occurring principally in England, France, and Germany.

TABLE O.
Strikes in Europe.

In the year 1870 there were	30 strikes.	In the year 1875 there were	245 strikes.
In the year 1871 there were	98 strikes.	In the year 1876 there were	229 strikes.
In the year 1872 there were	345 strikes.	In the year 1877 there were	180 strikes.
In the year 1873 there were	365 strikes.	In the year 1878 there were	268 strikes.
In the year 1874 there were	286 strikes.	In the year 1879 there were	308 strikes.

These strikes were indulged in by different trades: Carpenters, plumbers, masons, ship builders, engineers, boot and shoemakers, miners, bricklayers, carriagemakers, coopers, glass workers, drivers and carriers, laborers, printers and compositors, telegraph operators, saddlers, harness-makers, coal miners, coopers, cotton hands, and others. By throwing these trades into departments we have the following as the result:

TABLE P.

Building trades	598 strikes.	Stone trades (not masons)	54 strikes.
Metal trades	390 strikes.	Carrying trades	39 strikes.
Colliers and miners	339 strikes.	Carriage building trades	33 strikes.
Textile trades	227 strikes.	Food and drink trades	39 strikes.
Clothing trades	163 strikes.	Leather trades (not shoes)	28 strikes.
Ships and shipping	140 strikes.	Fiber trades	22 strikes.
Pottery and glass trades	63 strikes.	Agricultural trades	18 strikes.
Wood trades	63 strikes.		

The "building trades" comprise carpenters, joiners, plumbers, slaters, bricklayers, masons, plasterers, and laborers. The most important fact in connection with the foregoing is the time lost on account of the strikes during the same period.

TABLE Q.

In the year 1870.....	68 weeks were lost.	In the year 1875.....	684 weeks were lost.
In the year 1871.....	279 weeks were lost.	In the year 1876.....	952 weeks were lost.
In the year 1872.....	988 weeks were lost.	In the year 1877.....	759 weeks were lost.
In the year 1873.....	1,093 weeks were lost.	In the year 1878.....	1,621 weeks were lost.
In the year 1874.....	812 weeks were lost.	In the year 1879.....	1,774 weeks were lost.

Making a grand total of nine thousand and twenty-seven weeks, or fifty-four thousand one hundred and sixty-two days, that the strikers lost in the aggregate.

In 1871 the engineers, numbering nine thousand, and the strike lasting twenty weeks, lost \$900,000. The same year the nut and bolt makers, one thousand five hundred in number, lost \$300,000 during a strike of forty weeks; the colliers, one thousand eight hundred in number, were on a strike for twelve weeks, and lost \$1,900,000; in 1872 the house builders, sixteen thousand in number, were on a strike for twelve weeks, and lost \$600,000; in 1873 the colliers were on a strike eleven weeks, seventy thousand of them, and lost \$3,850,000; in 1878 the strike of three hundred thousand cotton hands lasted nine weeks, and their loss was \$1,150,000; in 1877 the masons were on a strike thirty-three weeks, one thousand seven hundred of them, losing \$280,000. The amount lost in wages alone by the strikes embraced in these statistics, not taking into account the "donations," or aid rendered by their organizations while these were on the strike, is estimated at \$22,334,750 during the period of ten years. Now, out of all these strikes, aggregating two thousand three hundred and fifty-two in number, that were engaged in during this period, only seventy-one are known to have been won by the strikers, one hundred and eighty-nine are known to have been lost, ninety-one compromised, making three hundred and fifty-one accounted for, and leaving two thousand and one unaccounted for.

When you see three hundred thousand remaining out of work for nine weeks, and at the end of that time lose the strike, it must seem clear to the majority of reasonable workingmen that strikes, even if successful, seldom, if ever, prove a benefit in the end. The actual loss of wages is seldom made up by subsequent labor at a trifling advance.

STRIKE IN PHILADELPHIA.

The recent coke strike in Pennsylvania is another illustration of the grievous error into which workingmen will fall when they think a strike will benefit them materially. Ten thousand men were kept idle for twelve weeks. They lost not only their daily wages, on the average \$2 25 per day, but many of them lost their little savings, the result of years of frugal economy, and suffered besides numberless untold privations. This strike, in which eleven thousand men participated, cost the laborers \$996,300, which means an actual loss of \$90 to each individual. It will take many a hard day's work and much patience and frugality to recover that sum, as most of it was hard cash saved in flush times. The logic of the situation is found in these few words from a Pittsburg dispatch: "If a sliding scale equal to a 12½ cents advance is arranged for them, it will take a year and nine months steady work to make up for the time they lost." Nor is the loss in wages the only one sustained, as such strikes are bound to have indirect effects. Many iron furnaces were banked during the strike for want of coke.

STRIKES IN SAN FRANCISCO.

Still another illustration of the fallacy of strikes as a panacea for all grievances is seen in the late strike of the cooks and waiters in San Francisco. This was a "sympathetic strike," inaugurated in consequence of a pending strike, and intended to uphold the members of the German, English, and American Bakers Unions in their demand for Sunday as a day of rest. Although they were strongly advised by the Federated Trades not to take such a course, the Executive Committee of the White Cooks and Waiters ordered all members in San Francisco and Oakland out on a strike. It cost the unions in the neighborhood of \$5,000 a day for wages, affecting some sixteen hundred men for over two weeks. It resulted in a failure. This brings with it its own moral. There are many issues upon which the best citizens of the country are a unit. All should be inspired with the common ambition to secure for America the highest perfection of civilization and social harmony, and to hold the standard of industrial conditions upon the highest plane of intelligence, comfort, and security.

The infant organizations in San Francisco are sometimes very difficult to control. Once in awhile headlessly and heedlessly they rush into the fray, caring for nothing but the furtherance of their own selfish ends. The Candymakers and the Lasters Unions have suffered greatly by precipitating themselves without justice or forethought. This occasional ripple in the labor movement has a tendency to injure the cause, and is not conducive to strengthen any organization. "Be sure you are right, and then go ahead," is the maxim of intelligent conservative forces. Experimental disturbances are neither profitable to the employé nor employer, and should under no circumstances be resorted to as a sort of "bluff" or intimidation. A strike should have the sanction of the entire union, and not of a committee merely, which may be composed of only a few hot-heads.

According to the statistics of strikes in California during a period of six years ending 1886, one hundred and seven strikes were inaugurated; eighty-eight had the sanction of the organizations, while nineteen were unauthorized. The strikes affected six thousand seven hundred and sixty-three men and women during the period, at a loss of \$324,629 to them, while the employers lost \$311,093. The total number of days lost was one thousand five hundred and eight. The older labor organizations in San Francisco are opposed to strikes, which is probably owing to the selection of conservative and intelligent leaders. The New York Bureau of Labor for 1886, in this particular says: "It would be better for all concerned if the example set by a few of the older organizations were more generally followed, and only experienced men selected to conduct affairs. They should, when found to be efficient, be retained at a fair salary. Too frequent changes of affairs in labor organizations has caused much trouble in the past."

This question of strikes is met with great care and good judgment by our conservative unions. Definite and peremptory rules are laid down in the by-laws of several unions. Those of the patternmakers, bricklayers, and printers are as follows:

BROTHERHOOD OF PATTERNMAKERS.

By-Laws Relating to Strikes.

SECTION 1. Whenever a dispute arises between an employer or employers and members of this Brotherhood, the members shall lay the matter before the local union, which shall appoint an arbitration committee to adjust the difficulty. Then, if said committee cannot settle the dispute, the matter shall be referred to the union.

If a two thirds vote, by secret ballot, of the members present in such meeting shall decide that the members be sustained, then the Corresponding Secretary shall be ordered

to transmit a detailed account of the grievances to the General Secretary, who shall forward the same to the Executive Board for their consideration.

SEC. 2. In case the Executive Board shall deem the grievance of sufficient character, the President shall send the District Organizer to said city, and cause a thorough investigation to be made. The District Organizer shall transmit a detailed report of this finding to the Executive Board. If said Board deem the grievance of sufficient cause, then they can declare a strike, provided the local union has acted in conformity with section one of this Article.

SEC. 3. The Executive Board shall then have the power, if they deem it advisable, to declare a strike. The General Secretary shall notify the local union in question within five days whether the strike or lockout is sanctioned.

SEC. 4. Not more than one strike in any case shall be permitted at any time by the authority and under the jurisdiction of the Brotherhood, and only one hour's strike notice shall be given the employers.

SEC. 5. In case the Executive Board fails to sanction any difficulty within five days, the local union can appeal to a general vote of all the local unions. The General President shall submit the appeal to a vote of the local unions, which shall be returned within fifteen days after date of issuing circulars. And if the appeal is sustained by a majority of all unions voting, the General President shall proceed as this constitution directs.

SEC. 6. In order to create a fund for the support of such members as may be engaged in authorized strikes or lockouts, it shall be required that each local union shall set aside fifteen per cent of their gross monthly receipts for a resistance fund.

SEC. 7. This fund shall not be used or appropriated for any other purpose, but shall remain as a separate fund in the custody of the local union, subject to an order of the General President, in conformity with this constitution. Any local union failing to comply with this section shall, after a notice of thirty days, be suspended by the Executive Board.

SEC. 8. When a strike is authorized, the General Secretary shall telegraph to the Presidents of all the local unions that a strike is pending. The President of each local union thus notified shall order the Financial Secretary to forward by telegraph the quota of resistance fund necessary for the support of the union on strike. Local unions failing to comply with this provision within five days from date of said notice shall be suspended.

SEC. 9. Strike benefits shall be paid to members at the rate of \$5 per week to married men, and \$4 per week to single men, and \$1 50 to apprentices if called out. In no case shall a fraction of a week be allowed for. The payment to commence the second week after the strike has been authorized.

SEC. 10. No member of the Brotherhood shall be entitled to any strike benefits unless he is a member in good standing for at least one week prior to the strike.

SEC. 11. Any local union or member entering into an unauthorized strike shall not be sustained or receive support from the Brotherhood.

SEC. 12. Unions sending money to each other must remit the same by telegraph, or express, or by post office order. The Secretary transmitting such money shall immediately send a receipt to the Financial Secretary, and a copy of such receipt to the President of the union from whence the money came.

SEC. 13. All strike money and its expenditure shall be reported to the General Secretary, who shall publish the same in his quarterly report by circular to the unions.

SEC. 14. Under no circumstances shall any moneys of the resistance fund be sent to the officer of the Executive Board of the Brotherhood.

BRICKLAYERS ASSOCIATION.

By-Laws, Strikes.

It shall be the sense of this association that a strike should only be resorted to when all other means should fail to effect a redress of grievances, and must first be recommended by the Board of Directors.

TYPOGRAPHICAL UNION.

By-Laws, Strikes.

SECTION 1. Whenever any difficulty shall arise between the members of this union and their employers (except for money due on wage account, or in the case of a threatened reduction or infraction of the scale of prices) the President shall, within twenty-four hours, call a meeting of the union (of which all members shall be constitutionally notified) to take action thereon, and no member shall vote on such question unless he is in good standing and has belonged to this union at least six months. Should three fourths of the members present decide in favor of a strike, the Executive Committee shall immediately prepare and transmit an accurate statement of the facts in the difficulty, together with the number of men involved (union and non-union) to the President of the International Typographical Union, and the union shall await a decision of their appeal before taking further action.

SEC. 2. In no case shall the men in any office determine on a strike, except for wages due; but in the event of any invasion by the employer or foreman of the scale of prices, or any portion of this constitution, the employees shall be required to communicate the facts in the case to the Executive Committee, who shall, if their decision be not satisfactory to both parties, call a special meeting of the union to determine the merits of the

question; *provided*, that the next stated meeting of the union shall be distant more than one week from the date of reference to the Executive Committee, or the exigencies of the case may require immediate action; and, *provided further*, that no strike shall be authorized by such special or stated meeting unless a majority of the members in good standing are present, and then only by a three fourths vote on scale of prices at such meeting. In the interim between the date of dispute and the final action of the officers and members, the office in which such dispute arises shall in nowise be clogged or retarded, but proceed as though no such difference had arisen.

SEC. 3. When there shall have been a strike ordered, according to the provisions of this Article, all union men shall be deemed to have been notified.

CARPENTERS AND JOINERS.

By-Laws, Strikes.

SECTION 1. When any difficulty arises between the members of any union and their employers, the members shall lay the matter before their local union, and if approved of by the union, the President shall appoint an Arbitration Committee to wait upon the employers, and endeavor to adjust the difficulty. Said committee shall report at the next stated meeting, and the local union shall then take such course as is prescribed in this constitution.

SEC. 2. If a two thirds vote, by secret ballot, of the members present in such meeting shall decide that the members be sustained, then the Recording Secretary shall be ordered to at once transmit a detailed account of the difficulty and the exact vote and action of the local union to the General Secretary, who shall call the Executive Board together within forty-eight hours, to act upon the application.

SEC. 3. The Executive Board shall then have the power, if they deem it advisable, to sustain the action of the local union, provided the local union has acted in strict conformity with this constitution. The General Secretary shall notify the local union in question within three days after action of the Executive Board, whether the application is sanctioned.

SEC. 4. Not more than one strike in any case shall be permitted at the same time by the authority and under the jurisdiction of the Board, and only twenty-four hours' notice shall be given the employers after the sanction of the Executive Board is received.

SEC. 5. In case the Executive Board fails to sanction the application within five days, the General Secretary must report such action to the General President; the local union can appeal to the General President for a general vote of all the local unions. The General President shall submit the appeal and facts to a vote of local unions, which shall be returnable to the General President within fifteen days after date of issuing the appeal. And if the appeal is sustained by two thirds of all members voting, the General President shall then instruct the Executive Board to proceed as this constitution directs.

SEC. 6. In no case shall a local union take action on any difficulty until all members in good standing of such union are duly notified, and it shall be the duty of the Recording Secretary to give the members at least two weeks' notice of any demand upon the employers.

SEC. 7. Any member going to work on a job declared on strike or lockout in accordance with the laws of this Brotherhood, shall be fined such sum as the local union may decide, but not less than \$5 for each day so employed.

SEC. 8. A local union desiring assistance from the Brotherhood can not order a strike until legal authority has been received from the Executive Board to do so. All local strikes without sanction of the Brotherhood shall be at the sole risk of the local union, and should be discouraged, and renders the local union liable to expulsion from the Brotherhood.

SEC. 9. When a strike or lockout is duly sanctioned, the General Secretary shall notify all the local unions as to the nature of the difficulty, and shall call upon each local union to send a fixed sum per week to the Financial Secretary of the local union involved; the President and Recording Secretary of each local union thus notified shall order its Treasurer to forward the sum required each week. Local unions failing to comply with this provision within five days from date of notice shall be suspended.

SEC. 10. Strike benefits shall be paid to members at the rate of \$5 per week to married men and \$4 per week to single men, to commence one week after the strike has been authorized by the Executive Board. In no case shall the fraction of a week be allowed.

SEC. 11. No member of the Brotherhood shall be entitled to any strike benefits unless he is a member in good standing for at least three months prior to the strike.

SEC. 12. Unions sending money to each other must remit the same by telegraph, or by express, or post office money order; the Treasurer transmitting such money shall notify the President of the union on strike. The Financial Secretary receiving such money shall immediately send a receipt to the Treasurer of the union from whence the money came, and a copy of such receipt to the Financial Secretary of said union.

SEC. 13. All strike money and its itemized expenditure shall be reported to the General President, who shall publish the same in his monthly report to the local unions.

SEC. 14. In order to create a fund for the support of such members as may be engaged in legally authorized strikes or lockouts, it shall be required that each local union shall set aside five cents per capita each month for a protective fund.

SEC. 15. This fund shall not be used or appropriated for any other purpose, but shall remain as a separate fund in the custody of the local union, subject to the order of the

Executive Board, in conformity with the constitution. Any local union failing to comply with this section, after a notice of thirty days, shall be suspended.

SEC. 16. Under no circumstances shall any money of the protective fund be sent to the General Secretary or Executive Board.

SEC. 17. The General President, in conjunction with the Executive Board, shall have power, when satisfied from facts and information in their possession that a strike should cease, to declare the same at an end, so far as the financial aid of the Brotherhood is concerned, and shall so notify all local unions.

SEC. 18. In case at any time the protective fund should become exhausted in the support of any legally authorized strike, the Executive Board shall have power to levy such special assessment as may be necessary to sustain such strike.

CANDYMAKERS STRIKE.

On September 12, 1887, the strike on L. Sarioni & Co. was ordered by the Candymakers Union, and which, as far as the firm is concerned, is on yet. The origin of the affair differs slightly, according to the version of both parties. The union men claim that the firm installed a non-union man as foreman in place of the union foreman, whereupon the men struck, leaving the factory in a body upon Mr. Sarioni refusing to reinstate the union foreman and discharge the "scab" foreman.

Mr. Sarioni, the senior member of the firm, denies the allegation of the union, claiming that on the particular morning of the strike he found the men idling, and refusing to go to work until the foreman, who was late, should put in an appearance. "I thought," says Mr. Sarioni, "that the men were incompetent to do the work without a guiding genius, so instructed the non-union and eastern man to act as foreman until the regular foreman's return, upon which the men struck." He furthermore avers that he never shall employ a union man again, as such high, dictatorial proceedings are not in furtherance to his idea of justice. The union men were immediately employed by another firm, so the strike virtually injured no one.

FURNITURE WORKERS STRIKE.

In the latter part of August last, six cabinet makers employed by Kreling Brothers, and members of the Furniture Workers Union, signed and handed to Martin Kreling, one of the firm, a petition asking for the introduction of the nine-hour system with ten hours pay. It was done without any consultation with their fellow workmen, and after the demand was conceded, and the men had promised to return to work, the union sent a committee to the firm to inform them that the men would not be allowed to go to work unless all of the employes would first join the union. To this the employes objected, and through the firm invited the six strikers to return to their places and show some kind of cordiality toward their fellow workers. The invitation was rejected, and the whole matter was given into the hands of the Federated Trades to arbitrate and adjust. Meantime the factory continued on the nine-hour schedule, notwithstanding the fact that other union factories kept up the old ten-hour schedule.

The Kreling employes state that in nearly all shops both union and non-union men are working together, and no effort is made to make them union shops or even to introduce the nine-hour system. They say they do not object to the union or to union principles, nor do their employers, but they insist upon being admitted upon a fair and equal basis with other members. They say that the union wants them to pay an initiation fee of \$5 in addition to a heavy fine of \$20 apiece, as a punishment for violating union ordinances.

They finally concluded to make a proposition to the union, stating the

terms upon which they would join, and the following gives the substance of it:

First—The boycott against the Kreling theater, store, and factory to be declared off immediately, as unjustified, the firm having nothing whatever to do with the controversy.

Second—There shall be no fine levied against any individual in the employment of the firm of F. W. Kreling & Sons, be he an ex-union member or not.

Third—Every one shall pay an initiation fee of \$1, and all employes to be taken in as a body.

Fourth—The union and the employes shall jointly appoint a person to hold the initiation fees until all employes are duly initiated into the union, the money to be paid to the union or its designated officer after the initiation of the employes.

Fifth—It shall be left to the option of the employes, or any one of them, to join either Union No. 15 or No. 25, or the Wood Carvers Union, if he be a wood carver.

Sixth—The three unions named to agree to these conditions.

Seventh—These unions to pledge themselves to withdraw all union members from shops where non-union men are employed, or the nine-hour system with ten hours pay is not strictly enforced, after February first next.

The difficulty was compromised by the non-union men joining the union and paying \$2 50 initiation. The union men who refused to strike paid, in the aggregate, a \$100 fine for the violation of union ordinances.

GLOVERS STRIKE.

On October 24, 1887, nearly all the employes of the principal glove manufactories of this city struck against a proposed reduction of wages. About three hundred and twenty-one, of whom two hundred and thirty were girls, quit work. The employes were endeavoring to secure a uniform schedule of prices in all the shops, instead of the varying rate which had heretofore prevailed. It was not for an increase of prices, but a desire to adopt the union schedule prevailing in the East. A copy was sent to the employers of each firm employing union help for their consideration. The schedule was presented not as a demand, but as a basis for mutual discussion and arbitration. The bosses met the schedule as a signal for warfare, and, without notice, posted in their various shops that on the Monday following a schedule of their own, showing a reduction of 20 to 50 per cent, as compared with the prices they had been paying, would be enforced. Upon this the employes walked out.

The manufacturers claim that the great majority of the statements made by the union was falsehoods. The union asserts that they are compelled to work from twelve to fifteen hours daily, which the manufacturers claim as false, as the shops are only kept open nine and one half hours per day, and but eight on Saturdays. In consequence of this denial the following communication was published by the Executive Committee of the Glovers Protective Union:

On Monday morning last the manufacturers posted a schedule of prices in the various shops, by which the prices in most of the branches of glove making, and including all the departments of women's work, were reduced from 15 to 50 per cent below the present paid wages. In no instance have the girls' wages been such as was stated, namely, from \$8 to \$18 a week. The rank and file have earned from \$4 to \$10 a week, a few skillful operators making \$12 a week. The statement that the factories only run nine and a half hours is correct, but the fact is concealed that as most of the girls work piecework they have to take work home evenings to make sufficient for their wants.

The wax-threaders are not reduced 5 cents a dozen, as stated, but from 10 cents to 25 cents per single dozen, making a cut in some kinds of work of \$1 a day.

The prices of gloves have not been reduced the least, and the manufacturers in the East have just lately voluntarily increased the wages of their employes, so that the only reason for the cut is the simple desire of the manufacturers to increase their profits, and the injustice was so glaring that nearly all the cutters joined in the strike, although they were not materially affected by the new schedule, the manufacturers having no chance to reduce their wages, as the difference of wages between the East and the Pacific Coast in that branch is so small, that if the difference in the cost of living, etc., is considered, the balance is in favor of the East.

The movement is not for an increase of wages, but a protest against a reduction by which prices are in some cases cut down to one half and mainly effected in women and girls, a class of society that already have difficulties enough to contend with in the shape of cheap competing labor and the efforts on every side to reduce their wages to a mere pittance.

These statements can, if necessary, be substantiated by a hundred affidavits, and any assertions to the contrary we brand as unmitigated falsehoods and simply efforts to blind the eyes of the public.

EXECUTIVE COMMITTEE GLOVERS PROTECTIVE UNION.

SAN FRANCISCO, October 26.

The strike was a failure, and all the glove makers, who could do so, returned to work at the old rates.

MESSENGER BOYS STRIKE.

The messenger boys have at various times struck for higher wages. The duration of such strikes are very short, as the supply of boys, in this service, far exceeds the demand. During the continuance of such periodical disturbances the juveniles parade the streets, bearing a number of transparencies, such as "We cannot support our mothers on 65 cents a day," "All we want is enough to live on and pay for our shoes and clothes," "All we want is two Sundays a month."

These youngsters seem to enjoy themselves thoroughly, and congregate around street corners, playing pitch and toss, marbles, etc.

Law Prohibiting Boys Being Sent to Houses of Ill-Fame.

At the last session of the Legislature a law was passed to prevent telegraph companies from sending boys to houses of ill-fame. During the time of the last strike, in order to ascertain to what extent Section 1389 of the Penal Code was enforced, I canvassed the telegraph districts of San Francisco, and found that the law was shamefully violated. The practice of sending minors to places of questionable repute by the telegraph companies was publicly done. There was no more secrecy of the practice than if the Act was never passed. The Act was approved March 15, 1887, and reads:

No minor in the employ of any telephone company, special delivery company, or association, or any other corporation, or person or persons, engaged in the delivery of packages, letters, notes, messages, or other matter, shall be assigned by such corporations, or person or persons, to hire such minors to keepers of houses, variety theaters, or other places of questionable repute, nor to permit them to enter such places of illegal or questionable calling; that this law shall apply to managers, superintendents, and agents of such corporations, and to be enforced against them.

This law never has been enforced and the offense seemed to be as general then as it was before its enactment.

The life of the messenger boy is a hard one. The encouragements and facilities open and tending to his downfall and disgrace are deplorable facts. His moral and physical ruin is a certainty when he is once allotted the task of delivering messages to, or acting as lackey for, the inmates or keepers of houses of ill-fame. The prevalence of crime in San Francisco no doubt is largely due to the want of an industrial training for boys and girls, and to the neglect on the part of parents and employers to look after their moral and social training. There was in the neighborhood of four hundred boys employed by the telegraph and telephone companies in San Francisco. The San Francisco and American District Telegraph Company employed about three hundred boys, many of whom were engaged in

delivering messages to, and running errands for, people of questionable character. They brought meals to their rooms; went to an opium joint and purchased opium; to a whisky mill for liquor; to a cigar store for tobacco; and even were hired for the purpose of alluring victims to these dens of iniquity by delivering letters of assignation. Of course the managers or superintendents of the District Telegraph Companies did not know the nature of the errands upon which the boys were sent by the people who hired their services. The companies kept an account of the time the boy was out, and were satisfied and asked no questions if the proper amount of coin for the time spent was paid in by the boy upon his return. The places where the boys generally purchased opium were at No. 5 Spofford Alley; the southwest corner of Sacramento and Dupont Street; and No. 765 Dupont Street. Boys were very anxious to be employed in the delivery of messages to those living in houses of bad repute, in consequence of the perquisites. There was money in it for them. When men are on a debauch they are generally reckless of how they spend their money, and the messenger boy whom they employed was liberally rewarded. Boys described to me scenes of depravity which they witnessed in opium joints and other places, which were simply horrible. How can the weak minded, or the neglected, or homeless among them, resist the temptation to indulge in the fascinating pipe, or sparkling wine, or other vice, where night after night they witnessed scenes of debauchery? It was told to me that the boys sometimes pay money out of their own pockets to the company, as if coming from the party who hired them, in order to prolong their stay in some of these places, where jollity and sin flourished. Opium houses, or "joints," as they are called, can be found in a great many places in San Francisco. Here is a list of some of them; No. 633 California Street; No. 523 Kearny Street; No. 644 Sacramento Street; No. 641 Sacramento Street; No. 807 Kearny Street; No. 425 Bush Street; No. 526 Pine Street; No. 604 Pine Street; No. 250 Sutter Street; corner of Jackson and Stockton Streets.

The rate the company charged for the use of the boys was as follows: Fifteen cents per half hour (least), 20 cents for forty minutes, 30 cents per hour, 25 cents for fifty minutes, 5 cents for every additional ten minutes over the hour. The boys when working overtime got 6 cents an hour. The Western Union Telegraph boys are employed exclusively in the delivery of telegrams. They are paid at the rate of $2\frac{1}{2}$ cents per message, and average from \$22 to \$25 per month. They work twelve hours per day. Night boys receive \$20 per month. The San Francisco District Telegraph and messenger boys are paid 5 cents per telegram and 6 cents per message. Boys on the night watch, who work from 6 P. M. to 6 A. M., with one hour for lunch, are paid 75 cents per night. They have to pay for the uniform which they wear, out of their wages. Formerly the boys averaged from \$1 to \$1 25 a day, but lately, in consequence of the greater number employed, they can average only from 50 cents to 75 cents per day—that is, for day boys. On Sundays the American District boys are paid 65 cents per day.

The Chief of Police of San Francisco determined to put a stop to the flagrant violation of the law forbidding the sending of messenger boys to houses of ill-fame, and had the manager or superintendent of one of the telegraph companies arrested. After some litigation the company surrendered, and the law is now enforced.

SAILORS STRIKE AT SAN PEDRO.

On the ninth day of December, 1887, in the port of San Pedro, Los Angeles County, I began an investigation into the origin, cause, and extent of the labor strikes then pending in that locality.

The strike commenced on December first, and I found there were about four hundred men out of work; about half of whom were sailors and the rest longshoremen. The latter had been employed in lumber yards, and in the loading and unloading of vessels which are almost entirely engaged in the lumber business.

In the course of my investigation, I examined the officers and many members of the several labor organizations concerned in the strike: the agents of the Shipowners Association, and the Coast Seamen's Union, masters of vessels, seamen, and those connected with the dispensation of justice and preservation of the peace, and the owners and foremen of the lumber yards.

My first inquiry related to acts of violence or disturbance of the peace. I found that two men only had been arrested for using threatening language; that they had been tried in the city of Los Angeles and acquitted. Not the slightest apprehension of violence was felt by employers and agents, and peace and good order prevailed. Sheriff Keyes informed me that he had been called upon to furnish twenty-five or thirty men to preserve the peace, but he found half the number amply sufficient.

Cause of the Strike at San Pedro.

I examined first the officers of the Coast Seamen's Union as to the cause of the strike; and their testimony showed that for about three weeks prior to December first (when the strike began), Mr. Savage, local agent of the Shipowners Association, assisted by an ex-policeman from San Francisco, named Burdett, had been causing the discharge of sailors who were employed on the wharves and in the lumber yards of San Pedro. These men were discharged because they were suspected of being members of the Coast Seamen's Union.

The avowed purpose of Mr. Savage, on behalf of the Shipowners Association, was to drive these men to sea, where they belonged. On being asked why the Shipowners Association pursued this course, the answer was: Because there is a scarcity of sailors, and the wages of those employed are therefore high. It is easier to get men to take the places of men working along shore than to get the trained hands required at sea. There was no disguise in this matter—the object and purpose were openly stated. Some twenty men were thus picked out and discharged.

Action Taken by the Men.

The men who felt themselves in the same plight with those discharged, not knowing how soon their turn would arrive, held a consultation among themselves, and determined, with one of the two local assemblies of the Knights of Labor, to quit work in a body. About one hundred and fifty men thus voluntarily left their employment.

Action Taken by the Sailors.

The sailors employed on the vessels in the port of San Pedro also held a meeting by themselves, and came to the conclusion that the only way to make the shipowners realize the condition of things in San Pedro was for them to refuse to discharge lumber from vessels, and to tell the captains to procure men in their places. As soon as this was done, the captains locked the forecastles, and told the men to take their clothes out of the vessel, or else they would have them stored in a warehouse, to remain there at the sailors' expense. When vessels were nearly discharged, the

captains would refuse to pay the men any part of their wages. Some of the sailors had as much as \$100 due them. The aggregate loss to the sailors of fourteen vessels in the port was computed at \$3,000. About sixty sailors from the vessels had joined the strike.

The Question of Wages.

The question of wages did not enter at all into this strike. A short time previous the men employed in the lumber yards made a demand for an advance of 50 cents a day. Half of this sum was conceded by the employers, with which the men expressed themselves satisfied. In one of the lumber yards of San Pedro men are paid \$2 50 per day, and in the other yards \$2 25. Men employed in unloading lumber from the vessels receive \$3 75 per day. Sailors were paid \$45 to \$50 per month.

I then proceeded to make inquiries from Mr. Savage, attorney at law, and agent of the Shipowners Association, and from captains of vessels, with the following result:

The Object of the Strike at San Pedro.

The main object of the strike is to force the Shipowners Association to discharge their agent in San Pedro, Mr. Savage, who is personally obnoxious to both sailors and longshoremen. The Coast Seamen's Union want to ship their men through their agent, Charles Hendrickson. The captains said they were willing to deal with the sailors directly, and the owners of vessels give them full permission to do so. This has not been the practice for a long time in consequence of the opposition of the Coast Seamen's Union. They deny that anything has been done, either by the Shipowners Association or by the captains of vessels, with the object of reducing seamen's wages.

Sailors in Eureka received \$38, in San Francisco \$40, while in San Pedro they were not satisfied with receiving \$45 and \$50 per month, but demanding \$55.

Sailors Brought from San Francisco.

On that very morning—Friday, December ninth—nineteen sailors had been brought down to San Pedro, at the expense of the Shipowners Association, to take the places of striking sailors. These men had been met at the railroad depot in Los Angeles, plied with liquor, tampered with, and the result was they refused to fulfill the contracts they had signed in San Francisco, and had joined the strikers.

A man named Britton had been employed by the Shipowners Association to take charge of and accompany these men from San Francisco to San Pedro. When asked how and where these men had procured the liquor, he answered that the men had obtained the liquor after leaving San Francisco, and that it had been smuggled in by means to him unknown.

Where the Liquor Came From.

I examined five or six of the nineteen men brought down by Britton, and the testimony was corroborative and accumulative that he himself had bought and paid for a demijohn of whisky which he had given to the men. Knights of Labor had mixed among the men at the railroad depot and given them liquor to drink.

Why they Joined the Strikers.

They testified that they had signed articles in the Shipowners Association office in San Francisco to work on certain named vessels, to sail to certain ports, at wages of \$40 per month. When asked why they broke through their agreement, they answered that before signing the articles in the office in San Francisco they asked if any trouble or strike existed in San Pedro. The agent, Mr. Carpenter, told them no. None of the men belonged to the Coast Seamen's Union. They would not be the means of taking the bread out of men's mouths, especially men of their own craft. The men were not only penniless, but their clothes, packed in trunk or satchel, had been checked by Mr. Britton, and he now held the checks in his possession and refused to deliver them up. All their meals, while on the road, had been paid for by the agent of the Shipowners Association. Four men had been brought by this Association on the seventh instant, and were taken on board vessels accompanied by officers, who prevented anybody having access to them.

Vessels Without Crews.

There were nineteen vessels lying at the wharves or in the stream at San Pedro. Six of these were ready to sail, but were unprovided with sailors. There were only four men ashore from vessels lying on the outside.

Effects of the Strike.

Contractors and builders in Los Angeles complained that work on buildings had come to a standstill in consequence of the lack of lumber. Builders were afraid to enter upon a contract to finish work by a certain time, through fear of their supply of lumber being cut short. Men engaged in every branch of the building trade were necessarily thrown out of work. Owners of lumber yards immediately set to work to engage new hands, and experienced no great difficulty in getting a supply of raw, inexperienced hands. With shipowners and masters of vessels, the task was far more difficult, as the risk was too great to put to sea with men knowing nothing of the duties of seamen.

The Labor Organizations.

After an investigation among the officers of the labor organizations of San Pedro and Los Angeles, I learned that the trouble originated in an organization known as the Longshoremen and Lumbermen's Association, which was started about six months ago in San Pedro. There are two assemblies of the Knights of Labor in San Pedro. The older and stronger one, having a membership of about one hundred and fifty, opposed the strike from the beginning, and never yielded until it was forced into it by the younger and weaker. The complaint is general, both on the part of lumber merchants and shipowners, and on the part of some of the officers of the labor organizations, that three or four over-zealous or designing men belonging to the Longshoremen and Lumbermen's Association, as well as to the lately organized assembly of Knights of Labor, have brought all this trouble about without proper justification or reasonable cause. More than that, these men forced their assembly into a strike in a manner violating the rules of their order, for they acted without the necessary authority from higher sources.

The Men Who Suffered.

The men connected with the first or older branch of Knights of Labor refused at first to join in the strike, and continued in this attitude until forced to join by orders from superior authority in Los Angeles. Many of these men were but ill-prepared for a strike. They had put up for themselves little homes which had not been paid for. They were paying by weekly or monthly installments for the land and the lumber. If they should fail in those payments, they were liable to lose all that they had already invested. Many of them had families to support, and how were they to provide the necessities of life in a place where there was no other field of industry?

Efforts at Arbitration.

Early in the strike, efforts were made to arbitrate difficulties and grievances. I made careful inquiry into what had been done. A difference amounting to a question of veracity exists between the contending parties, as to the question from whom did the propositions for a settlement emanate. But as no question exists as to the correctness of the propositions themselves, I herewith submit an affidavit made by W. S. Wolfe and Robert Adams, representing the Knights of Labor, which contains the substance of said propositions:

STATE OF CALIFORNIA, }
County of Los Angeles. } ss.

W. S. Wolfe and Robert Adams, being first duly sworn, each for himself deposes and says:

On Thursday morning, December 1, 1887, we, the undersigned, were called to San Pedro to investigate the cause of the strike, and to settle the matter, if possible, by arbitration.

We called on W. H. Savage, the agent of the Shipowners Association, who made us three propositions, as follows:

First—He would not discharge any members of the Knights of Labor for belonging to the Coast Seamen's Union, if they had been a member of the Knights of Labor six months.

This we promptly refused to accept.

Second—He reduced the time to three months.

This we also refused.

Third—He then suggested reducing the time to forty days, to which we made the following answer: "Reduce it to writing."

This was to give us time to hold a short conference outside the door. On stepping back into the room, he read the forty-day proposition, which we refused at once, stating that it would give our locals no relief, as he could then go on discharging Knights because they were found to be members of the Coast Seamen's Union.

We then stated that if he would reduce the time to thirty days we would submit it to the boys, but that we had no idea they would accept it. This he refused to do, and the conference closed.

Further deponents saith not.

W. S. WOLFE.
R. ADAMS.

Subscribed and sworn to before me this tenth day of December, 1887.

ROBT. N. BULLA,
Notary Public.

As this attempt at arbitration was abortive, no further efforts tending to conciliation were attempted up to the time of my arrival.

The stand taken by the Knights of Labor was, that they were fighting for a *principle*—something higher and nobler than any question of mere wages.

They denied the right of any man, or any set of men, to prescribe what organization a man may belong to, and what he may not, as long as the aims and objects of such organization were not in conflict with the laws of the land, nor did not infringe upon the legal rights of another. Every

American citizen, they declared, was fully guaranteed and protected in such rights by the Constitution of the United States, and they were not going to allow these rights to be taken from them. On the other hand, the agent of the Shipowners Association, captains of vessels, and lumber merchants, emphatically deny that they have discharged men on the ground of belonging to any particular labor organization. As far as my inquiries went, I have, however, come to the conclusion that sailors working along shore had been discharged who were members of the Coast Seamen's Union, and who were discharged because of that very membership.

Seeing the condition of things as thus described, I looked to find some mode of settlement. An abnormal condition of affairs existed which should be ended without delay.

The Deputy Sheriff had fifteen men patrolling the neighborhood day and night, as conservators of the public peace.

The organization known as the Coast Seamen's Union had been opposed from the very beginning to this strike on the part of some of its members. The resources of the union have been heavily taxed to provide for a large number of men out of work.

Upon inquiry I found the members of the Executive Council of the Knights of Labor prepared to negotiate upon, what appeared to me, most simple and reasonable terms. All they asked was a guarantee from the Shipowners Association and the lumber merchants that men should not be ostracized, that is, that they should not be refused employment or discharged from their work because they belonged to any particular labor organization; or, as they put it, "to any organization not opposed to the laws of the land."

Some of the captains and lumber merchants to whom I spoke expressed themselves as not caring to what labor organization a man belonged, and they were willing to accept these terms. But when I came into the presence of the agent of the Shipowners Association, Mr. Savage, I found that gentleman inexorable. He declined to negotiate upon any terms, for, as he said, there was no use in treating with men who would not consider themselves bound by any contract or agreement, oral or written, and who would break the same at their pleasure. The only way to treat with the strikers, or their representatives, in his opinion, was to get the whip-hand of them, and then compel them to submit to whatever terms he pleased to grant. The captains of vessels, who were present, knowing that Mr. Savage was acting under instructions from headquarters, tacitly acquiesced in his decision. The tender of my services as arbitrator was thus summarily rejected.

End of the Longshoremen Strike.

At a meeting of the Knights of Labor, held on Thursday evening, December fifteenth, the strike of the longshoremen was declared off, and the men were at liberty to return to work. Most of them applied at the lumber yards on the following day, but few were taken back. The owner of the Pedro lumber yard refused point blank to take back any of the strikers.

On the same day I had another interview with Mr. Savage, and he promised to use his influence with the lumber merchants to have all the members of the older assembly of the Knights of Labor, who had opposed the strike, restored to their places. Neither shipowners nor lumber merchants will ever again, as they affirm, employ any one of the four or five men who have been conspicuous in causing the strike.

Summing Up.

The first conclusion to be drawn is, that in a strike where so large a number of men were concerned, and so much bitter feeling evoked on both sides, all persons having the welfare of the State at heart should be gratified that peace and good order prevailed. Few cases of drunkenness were to be noted. The local Justice had no cases of a criminal character brought before him in which any of the strikers was the culprit.

The second conclusion is, that strikes should be resorted to by labor organizations only when all other efforts to obtain a redress of grievances have failed. This is the lesson which has been often inculcated by the Chief Master Workman of the Knights of Labor in the United States, Mr. Powderly. "Fools rush in where angels fear to tread," is an adage exemplified by the conduct of certain men in San Pedro. A strike entered upon so recklessly without the sanction of higher authority within the organization, with no proper effort having been made by peaceful negotiation to settle differences, did not deserve, and could not expect, a successful issue. The inevitable results have been, what they always have and ever will be, the depletion to a considerable extent of the funds in the order's treasury, and deprivation and want to many men, women, and children. With regard to the alleged causes of the trouble, which culminated in the strike, it is difficult to point them out clearly and satisfactorily, they are so befogged with mutual recrimination.

No testimony worthy of consideration reached me that members of the labor organization in San Pedro used any violence for the purpose of compelling men to join their ranks, or forcing them to quit work because they were non-union.

The whole contention boiled down amounts to this: Whether the ship-owners shall compel sailors to ship through the agent of their association, or whether the Coast Seamen's Union shall force said association to accept sailors shipped through the agency of their union. Naturally, feelings of a bitter and hostile nature have been engendered between the officers of these organizations on both sides. It has been the same everywhere in the ports of the lakes, in the ports along the Atlantic States, as well as in those along this coast. Both sides, the employers as well as the employed, have a perfect moral, as well as legal, right to declare who shall act as their agents. Unfortunately, the men selected for such posts are not often men of discretion and cool judgment. The result is friction, hasty action, and sometimes disastrous consequences.

If an agency could be established, controlled by the government, or under the immediate supervision of its officers, the causes of dissension would be obviated or removed.

Many of the sailors to whom I have spoken say they cannot be induced to ship through the Shipowners Agency, but are ready and willing to treat directly with the captains of vessels. As many of the latter expressed themselves ready to deal directly with the men, some *modus operandi* may be devised by which the inclinations of both in this same direction may be reconciled.

LASTERS STRIKE.

Several minor strikes were inaugurated by the Lasters Union against Cahn, Nicklsberger & Co. to compel them to discharge a force of apprentices, which the firm took to teach them different parts of the business.

The members of the union claim that instead of being taught the trade in all its branches, one branch was taught on the commonest kind of stock,

and came into competition with the skilled labor. The firm kept 15 per cent of their wages back until their contract was completed, when, owing to some dissatisfaction, the boys quit and forfeited their 15 per cent. The firm then agreed to hire no more boys than the union allowed to a shop. This agreement lasted until August 19, 1887, when three union men were notified that unless they sent in their resignations to the union there would be no more work for them. Upon this they informed the union men, who, fifteen in number, quit work. The matter was arbitrated, and the men returned to work a few days after.

PLASTERERS STRIKE.

In March, 1888, the Plasterers Union had a slight difference with a contractor, in consequence of employing his brother, a non-union man, on the New City Hall. About twenty men quit work upon a refusal to discharge the brother. A conference was held, and in a day or so everything was amicably settled by the brother joining the union.

STONECUTTERS STRIKE (ROCKLIN).

In October, 1887, it was decided by the Stonecutters Union to demand \$4 for a day's work, and they subsequently notified all contractors to that effect. Contractors were given the option of employing any man by the day or otherwise, as they saw fit, provided they paid by a price list compiled so as to be in unison with the day wages. All parties were perfectly satisfied, with the exception of one contractor, who said he would sooner run his works with non-union men than submit to the dictates of any union. He accordingly discharged all men who were holding offices in the union, and put on an excess of apprentices; the granite cutters allowing one apprentice and one tool sharpener to every "gang" of ten stonecutters, each apprentice to serve two years.

TYPOGRAPHICAL UNION (SAN BERNARDINO).

In January, 1888, San Bernardino inaugurated its first strike, when the union printers working on the "San Bernardino Times," including also the apprentice boys, dropped work and left the place. The trouble was brought about by the proprietor of the "Times" employing non-union men at the "case," and in the job and press departments, with the intention of getting rid of the union men as soon as possible. He openly affirmed his antagonism to union printers, saying he would not have a union man in the office.

BREWERS AND MALSTERS STRIKE.

In the case of the strike of the beer brewers and malsters (shown in the tables), the bosses had to accede to nearly all the demands of the union. The following contract, regulating and decreasing the hours of labor, substituting weekly instead of monthly payments, was accepted. One hundred and twelve members participated in the lockout when it took place, which number dwindled down to forty by the time it was won. Between \$9,500 and \$10,000 were lost in wages during its continuance, while the union expenses amounted to \$3,000:

ARTICLES OF AGREEMENT.

ARTICLE I.

Only union men shall be employed, but when it is impossible to get capable union men, the employers shall have the right to hire non-union men, with the understanding that such men shall immediately apply for membership to the union.

ARTICLE II.

All locked out and striking members of the Beer Brewers and Malsters Union, now out of employment, shall be given employment either in a brewery or malt house immediately.

ARTICLE III.

All non-union men now employed, upon application, shall be accepted as members of the union.

ARTICLE IV.

Should any employé, through sickness, be prevented from performing his work, such employé shall, after regaining his health, be reinstated in his former position, provided such sickness does not exceed two months.

ARTICLE V.

It shall be at the option of each employé to board and lodge where and with whom he pleases.

ARTICLE VI.

The following shall be considered cogent reasons for the discharge of employés: 1, negligence in the performance of his duties; 2, dishonesty; 3, lack of respect toward his employers or foreman; 4, unavoidable circumstances which render a reduction of the employed forces necessary.

ARTICLE VII.

Ten hours shall constitute a week day's work. Sunday work shall not exceed three hours in breweries and five hours in malt houses; apportionment of time to be agreed upon between the proprietor or foreman and the men employed. In the lager beer department of the breweries ten consecutive hours, with the exception of meal time, shall constitute a week day's work.

ARTICLE VIII.

Minimum wages: Employés in wash-houses, fourteen (\$14) dollars a week; employés in malt houses, brew, copper, and fermenting departments, sixteen (\$16) dollars a week. Overtime to be paid at the rate of thirty cents an hour in breweries, and fifty cents an hour in malt houses.

ARTICLE IX.

All employés shall be allowed free beer in moderation while at work.

ARTICLE X.

Should any employé stop working, he shall be entitled to a certificate setting forth his ability and honesty.

ARTICLE XI.

Any amendments or alterations to these rules can only be made by consent of both contracting parties.

The following tables, which give the strikes in California for the six years ending in 1886, were collected by the United States Bureau of Labor Statistics, advanced sheets of which were forwarded to this bureau through the courtesy of Colonel Carroll D. Wright, Commissioner:

TABLE R.
I. Lockouts by Years and Industries, in California.

INDUSTRIES AND YEARS.	Locality.	Cause or Object.	Ordered by Organization.	ESTABLISH- MENTS.		Beginning	End	Duration— Days	Succeeded	EMPLOYÉS—		EMPLOYERS Loss
				No.	Days Closed.					Loss.	Assist- ance.	
1884.												
Tobacco—												
Cigarmakers, etc.	San Francisco.	Against demand for increase of wages.	Yes	18	14	March 3	Mar. 17.	14	No.	\$17,075	-----	\$14,325
Cigarmakers, etc.	San Francisco.	Against demand for increase of wages.	Yes	2	15	March 3	Mar. 18.	15	No.	5,714	-----	4,300
Cigarmakers, etc.	San Francisco.	Against demand for increase of wages.	Yes	1	-----	March 3	Mar. 19.	15	No.	5,227	-----	1,200
Cigarmakers, etc.	San Francisco.	Against demand for increase of wages.	Yes	2	16	March 3	Mar. 19.	16	No.	3,713	-----	3,000
Cigarmakers, etc.	San Francisco.	Against demand for increase of wages.	Yes	1	17	March 3	Mar. 20.	17	No.	3,475	-----	1,250
Cigarmakers, etc.	San Francisco.	Against demand for increase of wages.	Yes	1	20	March 3	Mar. 23.	20	No.	765	-----	750
Cigarmakers, etc.	San Francisco.	Against demand for increase of wages.	Yes	1	21	March 3	Mar. 24.	21	Yes	1,594	-----	1,250
1886.												
Miscellaneous—												
Employes, laundry	San Francisco.	Against union men	Yes	1	14	July 8	July 22.	14	No.	2,654	\$500	800
			Yes	1	-----	July 10.	July 26.	16	No.	1,120	-----	1,000

* White boys and girls who had been taught in the technical school established by cigar manufacturers.

TABLE S.
II. Lockouts by Years and Industries, in California.

INDUSTRIES AND YEARS.	NUMBER OF EMPLOYEES.				AVERAGE DAILY WAGES.				EMPLOYEES LOCKED OUT.		EMPLOYEES LOCKED OUT AND INVOLVED.			NEW EMPLOYEES AFTER LOCK-OUT.			Brought from other places.		WEEKLY WORKING HOURS.	
	Before Lockout.		After Lockout.		Before Lock-out.		After Lock-out.		Number	Daily Pay.	Male	Female	Total	Male	Female	Total			Before Lock-out.	After Lock-out.
	Male	Female	Male	Female	Male	Female	Male	Female		After										
1884.																				
Tobacco—																				
Cigarmakers, etc..	1,194	115	1,309	1,196	\$1 11	\$0 85	\$1 14	\$0 86	1,309	\$1 09	1,194	115	1,309	48	7	55	---	---	50	50
Cigarmakers, etc..	354	42	396	349	1 14	86	1 19	83	396	1 11	354	42	396	---	6	6	---	---	51	51
Cigarmakers, etc..	267	60	327	280	1 33	90	1 37	90	267	1 33	267	---	267	19	---	19	---	54	54	54
Cigarmakers, etc..	222	19	241	213	1 13	83	1 18	84	241	1 10	222	19	241	2	---	2	---	50	50	50
Cigarmakers, etc..	180	25	205	181	1 15	1 06	1 30	1 02	205	1 13	180	25	205	3	8	11	---	50	54	54
Cigarmakers, etc..	27	7	34	28	1 33	94	1 41	94	34	1 25	27	7	34	1	---	1	---	54	54	54
Cigarmakers, etc..	73	---	73	73	1 04	---	1 03	---	73	1 04	73	---	73	---	---	---	---	54	54	54
Cigarmakers, etc..	143	61	204	134	1 18	86	1 31	86	201	1 08	140	61	201	7	5	12	---	57	57	57
1886.																				
Miscellaneous—																				
Employés, laundry	40	---	40	40	2 00	---	2 00	---	40	2 00	40	---	40	40	---	40	---	---	72	72

TABLE T.
I. Strikes by Years and Industries, in California.

Number	Industries and Years.	Locality.	Cause or Object.	Ordered by Labor Organization	ESTABLISH- MENTS.		Beginning.	End.	Duration— Days	Succeeded	EMPLOYEES—		Employers' Loss
					No.	Days Closed					Loss.	Assist- ance.	
1882.													
24	Food preparations— Can sealers, fruit canning—	San Francisco.	Against fines.	No.	1	—	July 11.	July 12.	1	Yes.	\$14	—	—
25	Metals and metallic goods— Molders, etc., iron works	San Francisco.	For additional helpers.	No.	1	—	Jan. 4.	Jan. 7.	3	Yes.	223	\$85	\$250
26	Molders, iron works	San Francisco.	For equal pay for all molders	No.	1	—	Dec. 15.	Dec. 29.	14	No.	630	—	500
1883.													
27	Boots and shoes— Employees	San Francisco.	For increase of wages.	Yes.	1	—	June 1.	June 22.	21	Yes.	3,330	450	3,000
28	Employees	San Francisco.	For increase of wages.	Yes.	1	—	June 8.	June 29.	21	Yes.	1,100	140	675
29	Employees	San Francisco.	For increase of wages.	Yes.	1	—	June 20.	June 27.	7	Yes.	465	60	250
30	Employees	San Francisco.	For increase of wages.	Yes.	2	—	June 28.	July 26.	28	Yes.	2,120	250	1,200
31	Employees	San Francisco.	For increase of wages.	Yes.	2	—	July 22.	Aug. 5.	14	Yes.	1,212	175	600
32	Employees	San Francisco.	For increase of wages.	Yes.	1	—	July 25.	Aug. 1.	7	Yes.	264	144	150
Cooperage—													
33	Coopers	San Francisco.	For increase of wages.	Yes.	6	—	July 9.	July 12.	3	Yes.	316	—	600
34	Coopers	San Francisco.	For increase of wages.	Yes.	4	3	July 9.	July 12.	3	Yes.	74	—	150
35	Coopers	San Francisco.	For increase of wages.	Yes.	1	—	July 9.	July 16.	7	Yes.	50	30	80
36	Coopers	San Francisco.	For increase of wages.	Yes.	1	—	July 9.	July 30.	21	Yes.	493	378	275
Domestic service—													
37	Waiters, restaurant	San Francisco.	Against employment of colored waiters.	No.	1	—	July 12.	July 22.	10	No.	256	—	100
38	Metals and metallic goods— Employees, brass works	San Francisco.	For increase of wages.	No.	1	—	July 8.	Aug. 5.	28	No.	2,240	225	300
39	Printing and publishing— Compositors	San Francisco.	Against employment of non-union men	Yes.	2	—	July 31.	Oct. 30.	91	No.	2,937	1,320	4,300
40	Public ways construction— Construction hands, railroad	Redding	For increase of wages.	No.	1	21	July 2.	July 23.	21	No.	55,300	—	25,000
41	Telegraphy— (Strike of July 19, see New York.)	—	—	—	—	—	—	—	—	—	—	—	—
42	Transportation— Deckhands, steamship.	Stockton	For increase of wages.	No.	3	—	June 7.	June 8.	1	No.	32	—	—
43	Longshoremen	San Francisco.	For increase of wages.	No.	1	—	Aug. 16.	Aug. 17.	1	No.	135	—	—

TABLE T—Continued.

Number	Industries and Years.	Locality.	Cause or Object.	Ordered by Labor Organization.	ESTABLISH- MENTS.		Beginning.	End.	Duration— Days.	Succeeded.	EMPLOYERS—		Employers' Loss.
					No.	Days Closed.					Loss.	Assist. Am't.	
44	Coal passers and firemen, steamship— 1884.	San Francisco.	For increase of wages—	No.	1	—	Aug. 27.	Aug. 28.	1	Yes.	\$34	—	—
45	Agricultural implements— Molders—	San Francisco.	Against employment of additional apprentices	Yes.	1	—	May 28.	June 18.	21	Yes.	630	\$300	\$350
46	Building trades— Painters—	San Francisco.	For increase of wages—	Yes.	10	—	May 5.	May 6.	1	Yes.	279	—	1,275
47	Painters—	San Francisco.	For increase of wages—	Yes.	8	—	May 5.	May 7.	2	Yes.	384	—	950
48	Painters—	San Francisco.	For increase of wages—	Yes.	7	—	May 5.	May 8.	3	Yes.	453	—	925
49	Painters—	San Francisco.	For increase of wages—	Yes.	2	—	May 5.	May 9.	4	Yes.	156	—	275
50	Painters—	San Francisco.	For increase of wages—	Yes.	5	—	May 5.	May 12.	7	Yes.	594	—	1,100
51	Painters—	San Francisco.	For increase of wages—	Yes.	1	—	May 5.	May 19.	14	Yes.	324	—	200
52	Clothing— Tailors—	San Francisco.	Against employment of two additional helpers.	Yes.	1	—	May 29.	July 17.	49	Yes.	1,911	910	100
53	Metals and metallic goods— Nailers, nail works—	Oakland	Against reduction of wages—	Yes.	1	91	Jan. 1.	Apr. 1.	91	No.	56,189	14,350	75,000
54	Blacksmiths, etc., iron works—	San Francisco.	Against employment of non-union men—	No.	1	—	Jan. 11.	Feb. 8.	28	No.	1,716	780	—
55	Molders, iron works—	San Francisco.	Against employment of additional apprentices.	Yes.	1	—	Apr. 25.	Apr. 28.	3	Yes.	90	40	35
56	Molders, stove foundry—	San Francisco.	Against employment of non-union men—	Yes.	1	—	May 21.	July 20.	60	No.	2,432	900	1,500
57	Tobacco— Cigarmakers—	San Francisco.	For increase of wages and against obnoxious rules—	Yes.	1	—	Mar. 3.	Mar. 24.	21	Yes.	3,000	—	—
58	Transportation— Officers and crew, steamship— 1885.	San Francisco.	Against reduction of wages—	No.	3	1	Aug. 30.	Aug. 31.	1	Yes.	(a)	—	353
59	Metals and metallic goods— Employes, iron works— 1886.	San Francisco.	Against reduction of wages—	Yes.	6	10	Feb. 9.	Feb. 19.	10	Yes.	27,891	1,550	6,950
60	Boots and shoes— Cutters—	San Francisco.	For increase of wages—	Yes.	1	—	Aug. 23.	Sept. 23.	31	Yes.	900	—	—

TABLE U.
II. Strikes by Years and Industries, in California.

Number	INDUSTRIES AND YEARS.	NUMBER OF EMPLOYÉS.			AVERAGE DAILY WAGES.			
		Before Strike.		After Strike.	Before Strike.		After Strike.	
		Male.	Female.		Male.	Female.	Male.	Female.
	1882.							
24	Food preparations—							
	Can sealers, fruit canning—	53	198		\$1 75	\$0 83	\$1 75	\$0 83
25	Metals and metallic goods—	225	---		2 57	---	2 54	---
26	Molders, etc., iron works—	118	---		2 71	---	2 69	---
	Molders, iron works—							
	1883.							
27	Boots and shoes—							
28	Employés	194	---		1 25	---	1 50	---
29	Employés	73	---		1 30	---	1 55	---
30	Employés	81	---		1 21	---	1 46	---
31	Employés	107	---		1 16	---	1 41	---
32	Employés	119	---		1 22	---	1 48	---
	Cooperage—	57	---		1 22	---	1 47	---
33	Coopers	57	---		2 75	---	3 00	---
34	Coopers	19	---		2 75	---	3 00	---
35	Coopers	4	---		2 75	---	3 00	---
36	Coopers	23	---		2 65	---	2 90	---
	Domestic service—							
37	Waiters, restaurant—	47	---		1 70	---	1 72	1 00
	Metals and metallic goods—							
38	Employés, brass works—	61	---		1 53	---	1 50	75
	Printing and publishing—							
39	Compositors	280	4		3 43	---	3 43	---
	Public ways construction—							
40	Construction hands, railroad	3,022	---		1 06	---	1 05	---
	Telegraphy—							
41	(Strike of July 19, see New York.)							

1883.		1884.		1885.		1886.	
42	Transportation—						
43	Deckhands, steamship	68	69	68	69	1 84	1 84
44	Longshoremen	103	103	114	114	1 50	1 50
	Coal passers and firemen, steamship	73	74	81	82	2 12	2 12
						1 20	1 20
45	Agricultural implements—	66	66	68	68	2 30	2 15
46	Molders						
47	Building trades—						
48	Painters	103	103	102	102	3 00	3 50
49	Painters	72	72	70	70	3 00	3 50
50	Painters	57	57	51	51	3 00	3 50
51	Painters	13	13	11	11	3 00	3 50
52	Painters	36	36	51	51	3 00	3 50
53	Painters	13	13	12	12	3 00	3 50
54	Clothing—						
55	Tailors	20	22	20	20	3 50	3 50
56	Metals and metallic goods—						
57	Nails, nail works	296	296	273	273	2 51	2 67
58	Blacksmiths, etc., iron works	386	386	386	386	2 27	2 27
59	Molders, iron works	70	70	68	68	2 25	2 24
60	Molders, stove foundry	31	31	21	21	2 50	2 46
61	Tobacco—						
62	Cigarmakers	150	150	150	150	1 33	1 40
63	Transportation—						
64	Officers and crew, steamship	219	222	219	222	1 60	1 60
65						83	83
66	Metals and metallic goods—						
67	Employés, iron works	1,182	1,182	1,126	1,126	2 35	2 35
68	Boots and shoes—						
69	Cutters	190	240	189	230	2 16	2 18
70	Domestic service—						
71	Cooks, waiters, steamship	27	27	35	35	*1 00	*1 00
72	Cooks, waiters, etc., restaurant	254	256	254	256	1 76	1 76
73	Food preparations—						
74	Bakers	80	100	80	100	2 50	2 50
75	Machines and machinery—						
76	Boilermakers	400	400	300	300	3 08	3 08
77	Boilermakers	500	500	500	500	3 00	3 00

* And board.

TABLE U—Continued.

Number	INDUSTRIES AND YEARS.	NUMBER OF EMPLOYEES.				AVERAGE DAILY WAGES.			
		Before Strike.		After Strike.		Before Strike.		After Strike.	
		Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
66	Metals and metallic goods—	174	---	174	---	\$3 18	---	\$3 05	---
67	Nailers, nail works—	26	---	26	---	6 00	---	6 00	---
68	Shipbuilding, etc.—	582	---	567	---	2 67	---	2 67	---
69	Machinists, boilermakers, etc., iron shipbuilding works.	250	---	250	---	75	---	90	---
70	Telegraphy—	200	---	200	---	*1 23	---	*1 23	---
71	Messengers	230	---	230	---	2 00	---	2 00	---
72	Transportation—	160	---	160	---	2 00	---	2 00	---
73	Deckhands, etc., steamship.	125	---	125	---	2 00	---	2 00	---
	Drivers and conductors, street railway.								
	Conductors, etc., cable railway.								
	Conductors, etc., cable railway.								

*And board.

TABLE U—Continued.

Number	INDUSTRIES AND YEARS.	EMPLOYÉS STRIKING.		EMPLOYÉS STRIKING AND INVOLVED.			NEW EMPLOYÉS AFTER STRIKE.		Brought from Other Places.	WEEKLY WORKING HOURS.			
		Number.	Daily Pay.		Male.	Female.	Total.	Male.		Female.	Total.	Before Strike.	After Strike.
			Before.	After.									
	1882.												
24	Food preparations— Can sealers, fruit canning	6	\$ 25	\$ 25	6		6				60	60	
25	Metals and metallic goods— Molders, etc., iron works	18	3 50	3 50	24		24	10		10	2	60	
26	Molders, iron works	14	3 75	3 62	14		14	10		10		60	
	1883.												
27	Boots and shoes— Employés	148	1 25	1 50	148		148	12		12		60	
28	Employés	47	1 30	1 55	47		47	4		4		60	
29	Employés	64	1 21	1 46	64		64	7		7		60	
30	Employés	76	1 16	1 41	76		76	6		6		60	
31	Employés	83	1 22	1 47	83		83	15		15		60	
32	Employés	36	1 22	1 47	36		36					60	
	Cooperage—												
33	Coopers	46	2 75	3 00	47		47	2		2		60	
34	Coopers	19	2 75	3 00	19		19	1		1		60	
35	Coopers	3	2 75	3 00	3		3					60	
36	Coopers	14	2 75	3 00	14		14	12		12	3	60	
	Domestic service—												
37	Waiters, restaurant	16	1 60	1 60	16		16	6	1	7		98	
	Metals and metallic goods—												
38	Employés, brass works	61	1 53	1 50	61		61	2	9	11		59	
	Printing and publishing—												
39	Compositors	50			55		55	34	4	38	11	60	
	Public ways construction—												
40	Construction hands, railroad	2,480	1 00	1 00	3,022		3,022	118		118		60	
	Telegraphy—												
41	(Strike of July 19, see New York.)												
	Transportation—												
42	Deckhands, steamship	24	1 33	1 33	24		24	24		24		67	
43	Longshoremen	103	1 50	1 50	103		103	114		114		30	
44	Coal passers and firemen, steamship	18	1 90		18		18	27		27		54	

STRIKES.

64	Machines and machinery—	46	3 25	3 25	217	217	50	50	60
65	Boilermakers	150	3 00	3 00	150	150	—	—	60
66	Metals and metallic goods—	26	8 75	7 68	161	161	—	—	55
67	Nailers, nail works	14	6 00	6 00	14	14	—	—	60
68	Shipbuilding, etc.—	48	3 25	3 25	246	246	124	124	60
69	Machinists, boilermakers, etc., iron ship- building works	185	75	90	250	250	—	—	72
70	Telegraphy—	9	*1 67	—	200	200	200	200	98
71	Transportation—	223	2 00	2 00	223	223	—	—	84
72	Deckhands, etc., steamship	100	2 00	—	100	100	150	150	98
73	Drivers and conductors, street railway	125	2 00	—	125	125	125	125	98
	Conductors, etc., cable railway								
	Conductors, etc., cable railway								

*And board.

TABLE V.
All Industries for all Years, in California.

INDUSTRY.	ORDERED BY ORGANIZATION.		ESTABLISHMENTS.				DURATION. (DAYS)		RESULTS.			EMPLOYERS—		EMPLOYERS' LOSS
	Yes	No	Number	No. Closed	Aggregate Days Closed	Average Days Closed	Aggregate	Average	Succeeded	Partly Succeeded	Failed	Loss	Assistance	
Agricultural implements	1	—	1	—	—	—	21	21.0	1	—	—	\$830	\$300	\$550
Boots and shoes	9	—	9	—	—	—	171	19.0	9	—	—	9,391	1,219	5,875
Building trades	33	—	33	—	—	—	104	3.2	33	—	—	2,190	—	4,725
Clothing	1	—	1	—	—	—	49	49.0	1	—	—	1,911	910	100
Cooperage	12	—	12	4	12	3.0	58	4.8	12	—	—	1,133	408	1,105
Domestic service	10	1	11	9	9	1.0	25	2.3	—	—	11	897	—	4,500
Food preparations	2	2	2	1	4	4.0	7	3.5	2	—	—	1,394	—	1,000
Machines and machinery	2	—	2	—	—	—	122	61.0	—	—	—	59,590	27,100	—
Metals and metallic goods	10	5	15	8	168	21.0	319	21.3	9	—	—	100,091	17,990	86,785
Printing and publishing	2	—	2	—	—	—	182	91.0	—	—	—	2,957	1,320	4,300
Public ways, construction	1	1	1	1	21	21.0	21	21.0	—	—	1	55,300	—	25,000
Shipbuilding, etc.	1	—	1	—	—	—	102	102.0	—	1	—	48,000	8,300	62,000
Telegraphy*	—	2	2	2	12	6.0	12	6.0	2	—	—	750	—	—
Tobacco	1	—	1	1	21	21.0	21	21.0	1	—	—	3,400	—	—
Transportation	6	8	14	5	9	1.8	294	21.0	7	—	—	36,905	13,000	115,353
Totals	88	19	107	31	256	8.3	1,508	14.1	77	1	29	\$324,629	\$70,547	\$311,093

* For general strike of July 19, 1883, see New York.

TABLE V—Continued.

INDUSTRY.	NUMBER OF EMPLOYÉS.						EMPLOYÉS STRIKING.			EMPLOYÉS STRIKING AND INVOLVED.			NEW EMPLOYÉS AFTER STRIKE.			Brought from other Places.	
	Before Strike.			After Strike.			Employés Striking.			Employés Striking and Involved.			New Employés After Strike.			Brought from other Places.	
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.
Agricultural implements.....	66	---	66	68	---	68	10	---	10	10	---	10	2	---	2	---	---
Boots and shoes.....	821	50	871	824	50	874	469	---	469	469	---	469	44	---	44	---	---
Building trades.....	294	---	294	297	---	297	231	---	231	262	---	262	62	---	62	---	---
Clothing.....	20	2	22	20	---	20	13	---	13	13	---	13	7	---	7	---	---
Cooperage.....	103	---	103	109	---	109	82	---	82	83	---	83	15	---	15	---	3
Domestic service.....	328	2	330	337	3	340	293	---	293	297	2	299	41	1	42	---	---
Food preparations.....	133	218	351	133	218	351	104	---	104	86	20	106	---	---	---	---	---
Machines and machinery.....	900	---	900	800	---	800	196	---	196	367	---	367	50	---	50	---	---
Metals and metallic goods.....	2,569	---	2,569	2,477	9	2,486	1,308	---	1,308	1,796	---	1,796	220	9	229	---	86
Printing and publishing.....	280	---	284	277	8	285	50	---	50	55	---	55	34	4	38	---	11
Public ways, construction.....	3,022	---	3,022	3,034	---	3,034	2,680	---	2,680	3,022	---	3,022	118	---	118	---	---
Shipbuilding, etc.....	582	---	582	567	---	567	48	---	48	246	---	246	124	---	124	---	---
Telegraphy*.....	250	---	250	250	---	250	185	---	185	250	---	250	---	---	---	---	---
Tobacco.....	150	---	150	150	---	150	150	---	150	150	---	150	---	---	---	---	---
Transportation.....	1,178	5	1,183	1,187	5	1,192	884	---	884	1,072	3	1,075	640	---	640	---	---
Totals.....	10,696	281	10,977	10,530	293	10,823	6,763	---	6,763	8,178	25	8,203	1,357	14	1,371	---	100

* For general strike of July 19, 1883, see New York.

CHAPTER IV.

CHINESE UNIONS AND STRIKES.

The extreme secrecy with which all Chinese organizations are enshrouded, rendered it a task of exceeding difficulty for the bureau to obtain any information concerning them. Some few facts, however, not wholly uninteresting, were brought to light, which, coupled with facts of a similar character taken from Consular reports, show with what similarity the Chinese guilds and organizations are conducted as compared with the most approved American system.

Every city in China has guilds controlling arbitrarily every industry and branch of business. Boycotting is carried on to a sometimes oppressive limit. The large cities of China are ruled entirely by Trades Unions, the membership of which is compulsory under the threat of torture or sometimes death. They regulate the hours of labor, apprenticeship, strikes, and wages. Blacksmiths, carpenters, wire drawers, silk weavers, millers, postal companies, barbers, etc., are banded together into a federation for mutual aid and protection. Some unions are particularly famous for their truculency, and very few cases are reported where a member is guilty of a breach of the rules, or is found uninterested in the proceedings of a meeting, for fear of the administration of the law, which is extremely and ridiculously cruel, as the following case will undoubtedly show: At Soochow, one of the gold leaf craft was adjudged guilty of violating the rule of the union forbidding the taking of more than one apprentice at a time. He was summoned before *their tribunal*, found guilty of his great crime, and punished by the cannibalistic process of being eaten to death by one hundred and twenty-three men, each taking a choice morsel and repeating the operation with crimsoned lips, until the culprit expired amid the savage yells of these imps of hell's contagion. Such treatment surprises and disgusts people of a civilized community, while the Chinese see the imperative necessity of rigidly enforcing union rules.

Strikes are a rarity, but when one does occur, their demand is acceded to without question or hesitancy. The introduction of labor-saving machinery into Canton encountered such violent opposition from the unions, that the authorities were in consequence compelled to remove it to Hongkong. Machinery for sewing shoes especially, fired their hearts to such a heat, that a general uprising was apparent. The unions formed themselves into a federation with the intention of prohibiting, by all means, the use or invasion of this enemy to honest labor. It is remarkably strange, but nevertheless asserted as true, that coöperative clubs are more common in China than in America. It is stated by some writers and authority on Chinese unions that they are an exceptionally mild people, and no "population are so docile, so law abiding, as that of Soochow, the Athens of China, when their blood is *not up*." Ordinarily mild measures are resorted to as a preliminary movement to subjugate and bring the offending member to terms, "and rarely," says the authority, "do such measures fail of success." The western mechanics are the most truculent, and resort to treatments far more cruel and barbarous than the one cited above.

CHINESE FISHMONGERS UNION

Is the most wealthy organization in China. It has a reserve fund of \$700,000 let out at interest, invested in bank stock, thus rapidly enriching

itself yearly. This union is very peaceable, holding that good faith between the merchant and purchaser is of paramount importance to further the objects of organization, as is shown in the following:

PREAMBLE.—We have heard that in trade and mercantile transactions generally, sincerity and good faith are of prime importance, in order that neither seller nor purchaser should incur loss. We have long been engaged in fishmongering, and the rules originally formed having become partially obsolete, we now remodel them to meet the changes, hoping that, both dealer and purchaser being upright, these regulations will ever after be conformed to.

The unions of the mechanics are usually composed of the masters and journeymen. Where the journeymen are very numerous they have their own organization, but such instances are exceedingly rare.

CHINESE BLACKSMITHS UNION

Is composed of master and workmen, who work harmoniously together, and very often convene for the purpose of regulating the prices of manufacturing. Very recently they called a meeting at Pelladium Temple, and agreed (during a theatrical entertainment, etc.) on a new tariff of wages and prices for the manufactured wares. At all times, such means are readily conformed to by the manufacturers, very few cases being on record where the wage earners have not been triumphant. It may be supposed that such dictatorial proceedings on the part of the union would have a tendency to despotism, laying the manufacturer open to the optional demands of the union. Such, however, is far from being the case, as the merchant or manufacturer has the protection of the magistrate or the Emperor. They form their own combinations to keep up prices and neutralize the tendency of unrestrictive competition. They fix a uniform value on the products of manual labor, while the combination of the laborers checks the sordidity of the manufacturer in regulating a minimum of wages.

CHINESE MILLERS UNION.

The Chinese Millers Union has in a preamble seen fit to regulate more strictly, for the better governing of the craft, a uniform standard of combination prices and wages; thus restricting the ravages of competition and bettering the condition of the wage earners. An infraction of this rule lays the culprit subject to the cost of a play and feast—the usual penalty.

GENERAL REMARKS ON CHINESE TRADES UNIONS.

Hours of Labor.—The union men have the hours of labor regulated and are not allowed to work beyond the specified time. They are paid by the amount of labor performed; weaving is not allowed after nine o'clock at night. Custom regulates the hours of work of those who are working by the day. Carpenters work eleven hours in summer, while but nine hours in winter; masons work half an hour longer.

The laboring classes of the lowest order toil incessantly throughout the whole year, Sunday being no day of rest for them. Perhaps at the end of the year they may get a few days rest, but that is all; still this class is surprisingly the most happy and contented of all wage earners; never raising riots, or insurrection, striking, or asking for shorter hours or more pay.

Apprentices.—The majority of the unions have very imperative and

severe apprentice laws. The gold beaters at Wenchow prohibit any from learning the trade but the sons and nephews of the workmen or masters. The western unions strictly debar and prohibit women of any class to work at occupations where men are employed. Perhaps this is to teach the women to cultivate the domestic duties, leaving the manual labor for the men. Needle-makers make an exception in favor of allowing the daughters and wives of members of the craft to acquire the art of "drilling eyes." None are allowed to marry outside of the union. Apprenticeship varies according to the trade; from three to five years being the established time. Food and lodging are provided by the employer, while clothes and a premium can be demanded, and usually are furnished by the parents. A person who learns the trade, must have his credentials as having served his full term when applying for work, or else no one is allowed to employ him. The penalty of a breach or violation of the agreement entered into, is to pay the expenses of a play, three tables of viands, and liquor. So rigidly are the rules enforced, however, that an infraction is a rare thing. Honor is a common thing among the different Chinese Trades Unions. Restrictions are placed upon the members, and fines imposed for making an article inferior to what the craft allows. The quality and price of articles are regulated. Dealers who put defective wares upon the market are considered as guilty as those who dispose of them at reduced rates. No alloy is allowed in tin or other ware, it must be the "Simon pure" article; thus the Chinese prove themselves superior, although pseudo-civilized, to most of our manufacturers, who are noted for the very opposite kind of public beneficent spirit.

The Chinese Dyers Trade Union, in their preamble, declare that "business requires for its proper administration that there should be equitable rules and good faith in their observance, and that, owing to the fluctuation of the price in indigo, it is to the interest of all concerned that charges of dyeing should be fixed twice a year; that during the semestral period the tariff should undergo no change whatever." It is also provided by that craft that accounts shall be settled at each of the three periods into which the year is divided; which means that not only master dyers shall owe no money, but that all moneys due him shall be collected—long accounts being inimical to the common interests of the craft.

CHINESE STRIKES.

The Chinese Trades Unions, or "Tongs," as they are called, in San Francisco are very rarely heard of, but nevertheless exist and are very powerful. In case of a strike or boycott they are fierce and determined in action, making a bitter and prolonged fight.

Only a short time ago the Chinese carpenters and bricklayers struck for higher wages. The carpenters had been receiving \$2 50 per day of ten hours, and struck for an advance of 50 cents for the same time. When a house is built in Chinatown, as soon as the walls and roof are completed by white labor, the building is turned over to Chinese carpenters, who construct the partitions, doors, bunks, and other interior work. Large, massive doors, made of beaten brass, some measuring a foot in thickness, are constructed to act as barricades against the numerous charges of the police. Gold beaters, jewelers, bakers, shoemakers, and cigarmakers have their "Tongs."

A white manufacturer of overalls, who employs members of the Kan Yee Tong, once succeeded in getting his men to work for 10 cents a dozen less than the union rate, on his agreeing to keep a false set of books, showing

an ostensible payment of regular rates. The scheme was a failure, the merchant was boycotted and blacklisted, while the renegade members of the *Han Yee Tong* were fined and expelled. The "*Hang Tong*" (gold and silver-workers), have a very powerful union and more exclusive than any other. An initiation fee of \$10 must be paid, while the applicant must have served six years in the trade. The Chinese average about \$525 a year, the hours of labor ranging very peculiarly, 8 A. M. to 12 M., 12 M. to 4 P. M., from 5 to 8 P. M., and again from 8 until 11 P. M. The intermissions at 12 M. and 4 P. M. are for lunch and dinner. Breakfast is eaten at 7 o'clock, thus bringing all the meals close together according to the most approved American idea.

COST OF CHINESE LIVING.

The cost of living for a Chinaman is marvelously low. But considering the manner in which they live, sleeping in hanks, thirty or forty of whom are in a room twelve by twelve and arranged in tiers three or four feet high. A Chinaman's trousers and shoes cost \$1.50, shoes, \$1.40. His outlay for clothing may not exceed \$1 in a whole year, his lodging, \$.50 per year, while he earns in the average, 90 cents to \$1.50 per day, according to his work.

Lodging per day 1 cent, per year	\$1.80	
Food per day 20 cents, per year	72.00	
Clothing per year	1.40	Total earnings .. \$320.00
Two quarters of 10 cents	1.20	Cost of living .. 84.92
Remaining food 200 cents a month	1.20	Yearly earnings .. \$230.08
Yearly cost of living	\$84.92	

The *Tung Tuck Tong*, or the Chinese Cigarmakers Union, some time ago issued a very characteristic circular to white cigar manufacturers employing "coolie" hands. The Chinese union had struck for an increase of 5 cents per hundred cigars, and at the same time demanded the privilege of boarding where they pleased. The white manufacturers were in league with Chinese boarding-house masters, who paid 30 cents per head per week for every Chinaman sent to his house to board. In a manufactory where three hundred or four hundred Chinese work, it made quite a consideration for the manufacturer. Such employees were as victoriously under the control of their master as poor Jack is under the control and owned body and soul, by boarding-house masters along the waterfront. It was, therefore, to better their condition financially and socially that the following circulars were sent to the manufacturers:

To the reader, No. 25 Sacramento Street.

We, *Tung Tuck Tong*, wish to find out some way or rather to have Mr. — our position discharged because they make our company's rules. If Mr. — discharges No. 1 and No. 2, our position, we, *Tung Tuck Tong*, will become here with two good hands, and guarantee they will work cheaply for you. They will not work for any cheaper at any place.

Another circular, of no less interest, is the following:

To the reader:

We, *Tung Tuck Tong*, the Chinese Cigarmakers' Fraternity Union, wish to find out some way or rather to have Mr. — our position discharged because they make our company's rules. If Mr. — discharges them, we, *Tung Tuck Tong*, will become here with two good hands, and also guarantee they are good workmen. They would not work any cheaper or dearer.

CHAPTER V.

REMARKS AND SUGGESTIONS FROM TRADES UNIONS AND FROM WORKINGMEN.

Suggestions from the Trades Unions.

Carpenters, No. 182—"In order to furnish work for the increased population we suggest the institution of the eight-hour movement."

Carpenters, No. 47—"The best thing I know of is for the members to attend the meetings regularly, and take an interest in the work of the Order. Under such conditions any organization is bound to succeed."

Carpenters, No. 133—"Stop importing carpenters, as there are too many on the Pacific Coast. A refusal to work with 'scabs' or 'rats,' as we term them."

Carpenters, No. 114—"Eight hours for a day's work. Honest legislation."

Carpenters, No. 56—"Make the eight-hour law compulsory on all employers. Make the wages of any laborer over twenty-one years of age \$2 per day of eight hours. Make apprentice laws for all skilled trades. Make all improvements on the land free of taxation. Amend mechanic's lien law to give laborers priority of claim over material men, and full amount of wages due. Make weekly payment of wages in cash compulsory."

Carpenters, No. 300—"To employ none but competent workmen and apprentices."

Carpenters, No. ——"Remove the tariff on lumber. Legislate compelling the railroads to receive and deliver all classes of freight as it is received, to the full extent of their power. Establish agencies throughout the different parts of the States, empowered to act subject to appeal under the Interstate Commerce Law. Make the nine hours obligatory to all members. Prohibit all good union workmen from working as partners, or mixed on a job with the 'saw and hatchet' brigade. Fix a minimum standard rate of wages and standard hours of labor. Give a greater circulation and distribution of trades union and labor papers."

Carpenters, No. 303—"Less time and more money, and ask Government to pay all contractors and make contractors pay every week all they owe the men."

Carpenters, No. 298—"A more close amalgamation of all the labor organizations would improve the cause."

Carpenters, No. 312—"I would suggest that nine hours ought to constitute a day's work, and that carpenters should be graded so that a first class man would not have to work for the same that a 'saw and hatchet' man does."

Carpenters, No. 36—"A strict apprentice law whereby apprentices would be obliged to serve an apprenticeship of at least four years."

Carpenters, No. 316—"To shorten the hours of labor for every man who has to work for a living."

Carpenters, No. 22—"We think that the enforcement of the eight hour law, with a heavy penalty for the violation of the same, would greatly improve the condition of the craft in the State. We are strongly opposed to the State and municipal work being contracted out to local firms and corporations."

Cigarmakers (Los Angeles)—"Entire exclusion of the Chinese; not to repeal the internal revenue, or the existing tariff on imported cigars; the prohibition of children under twelve years to work in the factories; to abolish the tenement house system in New York, but thoroughly organiz-

ing all cheap districts in the East, and the strict enforcement of revenue laws."

Bricklayers (Sacramento)—"Drink less liquor."

Painters and Decorators (San José)—"A liberal education and an ordinary amount of mother wit."

Typographical Union (Los Angeles)—"Coöperation and unity."

Typographical Union (Sacramento)—"With unexcelled facilities for the production of work in this city, our craft could be benefited by our merchants dealing with Sacramento printing offices, and not sending so much of their printing to other cities, and particularly those merchants who depend on the working classes for their maintenance in business. We also favor a State apprentice law."

Typographical Union (San José)—"A visit occasionally from good speakers at the meeting, to arouse them to a little agitation; a State apprentice law."

Cigarmakers (San José)—"Prohibit Chinese immigration. Legislature should enact laws prohibiting the employment of children under fourteen years of age to work in factories. Enforcement of sanitary laws in factories. Prohibit the importation of labor under the contract system. Stop the competition of prison labor with free labor."

Bricklayers (Los Angeles)—"Eight hours a day would benefit our craft very much. It would give employment to a great number of bricklayers that are now idle."

Tailors (San Francisco)—"That the employers furnish healthy work-rooms, or shops, sewing machines, machine silk, stove, iron, and coal."

Carpet Upholsterers (San Francisco)—"Some young boys and men who never sewed any, apprentice themselves into a store and try to work for one half the regular rates, for which we would like a remedy. This has a tendency to lower wages."

Cigar Packers (San Francisco)—"Drive out the Chinese. Like the vampire, they are sucking the life-blood out of our people."

Pavers (San Francisco)—"Enforce the eight-hour law."

Patternmakers (San Francisco)—"In our opinion it is necessary for the bureau to visit all shops to compel employers to make necessary improvements for the safety, comfort, and well being of their employés. See to the sanitary condition, unprotected belts of machinery, elevated traps, stairways, etc."

Coremakers (San Francisco)—"To improve the craft, there is need of a law to limit the number of apprentices. Some shops employ more boys than men. I mean a law of our own which we could enforce, similar to the iron-molder apprentice law."

Ironmolders (San Francisco)—"I would suggest that other crafts organize as the ironmolders are, and then strike, if necessary. It is foolish to strike when the non-union men outnumber the union men. I am in favor of all strikes, for my experience has taught me that it is the only means of getting what belongs to all mankind, *i. e.*, the right to live and bring up a family, thereby having a comfortable home."

Machinists (San Francisco)—"A reduction of working from ten to nine hours per day. Weekly payment of wages instead of paying once and twice per month."

Laborers Union (San Francisco)—"Stop beer drinking."

Glassblowers (San Francisco)—"It would help our business if the importation of foreign demijohns could be stopped."

Glovers Union (San Francisco)—"Shorter hours and more pay. Uniform schedule of wages."

Stationary Engineers (San Francisco)—“A law compelling the inspection of steam boilers and examining and licensing the engineer in charge, solely for the purpose of better protection of life and property.”

Marine Engineers (San Francisco)—“A hearty coöperation of all those of our fellows who are desirous of maintaining a strict integrity.”

Dry Goods Men (San Francisco)—“A general closing of all stores at 6 p. m. during six days in the week, and remaining closed all day on the seventh.”

Draymen and Teamsters (San Francisco)—“That men should be more temperate in their habits. Liquor has been a great curse to teamsters in general.”

Candymakers (San Francisco)—“Eight hours per day and no Sunday work. Christmas times we work for three months, day, night, and Sundays.”

Coopers (German)—“The abolition of the system of employment of apprentices through the journeymen workers. Better security of the workers against dangerous machinery, which claims many victims yearly. Mutilated hands and fingers are common occurrences in large cooper shops.”

Coopers (English)—“Shorter hours and more pay.”

Calkers Union (San Francisco)—“Are perfectly satisfied; nothing could improve the condition of the craft. Perfect harmony and contentment exists with all the members.”

Bricklayers (San Francisco)—“Extension of the fire limits and the construction of more permanent buildings.”

Bag and Satchel Makers (San Francisco)—“Have the members thoroughly organized; stand heart and hand with the by-laws and constitution; attend the meetings and then strike for one apprentice for every six journeymen, thus avoiding the inevitable consequences of apprentices starving the skilled laborer.”

Barbers (San Francisco)—“Abolish all ten-cent shops. Have reasonable hours of labor; from 7:30 A. M. to 8 P. M. would be satisfactory. The barbers are sadly in need of organization, which is the only remedy for unrestricted competition among men of their own craft.”

Boot and Shoe Makers (San Francisco)—“The adoption of a State stamp law, whereby the purchaser could distinguish between white and Chinese manufactured goods.”

Remarks from Workingmen.

“Proportional representation. Swiss ‘referendum.’ Shorter hours, nine, eight, or seven hours per day. Abolition of the contract system. Total expulsion of the Chinese. Carry out the principles of the Knights of Labor.”—Printer.

NOTE.—The “referendum” is the plan of submitting to the vote of the electors all laws, rules, etc., for ratification or rejection, after having been passed by the Legislature or Board. In Switzerland—the only country in which the referendum has yet been used for legislative purposes—all proposed laws must be submitted to the people on demand of thirty thousand voters, which is about one fifteenth of the constituency. This avoids the necessity of bringing before the people a large number of laws pertaining to the details of administration, it being assumed there cannot be any great opposition to any law when not a fifteenth of the constituency desire its submission.

In the management of the affairs of labor, coöperative, and other societies, it would seem that if four fifths of the managing body (the whole body having been elected by proportional representation) approve of a certain measure, the majority of the members would also approve of it. But as these may be scattered, perhaps the referendum should be used on demand of one tenth of the members, of one fifth of the Board of Directors, or other managing body. The principle could be extended affirmatively also, so that any measure proposed by one fifth of the Directors or by one tenth of the members should be

submitted to the vote of the whole membership, thus securing absolute democracy. This could be embodied in the constitution as follows:

1. On demand of one fifth of the members of the Board of Directors, or one tenth of the members of the —, any constitutional provision, law, rule, or regulation, passed by said Board, must be submitted to all the members for ratification or rejection by a majority vote; and any constitutional provision, law, rule, or regulation rejected by said Board, or which no member of the Board will introduce therein, shall be similarly submitted for ratification or rejection by the members as a body. But any proposition, law, rule, or constitutional provision so submitted and rejected by a majority vote, shall not be resubmitted in less than six months from the date of said first submission.

"To have the State law enforced which makes eight hours a legal day's work; the enforcement of this law would offer opportunities to the painters to educate themselves."—Painter.

"I am a man connected with organized labor all my lifetime, and am under the impression that the only remedy is in the reduction of hours. The seven-day working system should be abolished; it would give all willing to work employment, which, however, cannot be done only through organization, as it seems our employers and the law will never enforce or remedy the same."—Baker.

"Enforce the law in regard to the importation of foreign labor by contract and the restrictions that are placed upon the Chinese; also abolish child labor."—Cigarmaker.

"Prevent men who have not served an apprenticeship from working and usurping trade by working under standard wages. To prevent employers from employing such, or if so employed, to pay them proper wages. To encourage tradesmen in organizing for mutual protection, social, moral, and intellectual improvement, and elevation of labor."—Painter.

"I see no reason why mechanics should labor a greater number of hours than the clerks in municipal and government offices, with no reduction of pay. At reduced hours, men, now idle, could be employed."—Pattern-maker.

"I have been trying to solve the labor problem, but have not come to any definite conclusions as yet. With the exclusion of the Chinamen there would be room for at least two thousand more white men in our trade."—Cigarmaker.

"Establish by law the number of hours to be worked per day, without overtime, and half holiday on Saturday."—Painter.

"The coöperative system and general reduction of the hours of labor. The total abolishment of the seven-day work system; also laws that will enforce such. I would also recommend thorough investigation by the bureau into the baker trade as regards the cleanliness of the goods used by the public."—Baker.

"The coöperative system; decrease of the hours of work. Every wage worker should lay down his work at twelve o'clock Saturday noon, with a full week's payment. Better laws to keep away Chinese immigration."—Confectioner.

"Coöperative system and general reduction of the hours of labor. Also, laws that will enforce such."—Butcher.

"If we did not have to compete with the Chinese we could earn more individually, and have about three thousand men working here, instead of the paltry few at present."—Cigarmaker.

"Fire out the Chinese and it will bring to this coast about three thousand men in our line of the business."—Cigarmaker.

"Sobriety, I think, would greatly improve the condition of the wage earner."—Sailor.

"After thirty years' experience, I would suggest that all wage workers study economic principles. Do away with the middleman that stands

between the producer and the consumer. Quit drinking whisky. Shorten up the hours of labor until all persons are employed that should work. Remedy these evils and others in rotation, as they present themselves."—Harnessmaker.

"Compulsory education for all children under sixteen years of age. Abolish contract labor. Restriction of foreign immigration and Chinese. The appointment, by all States, of Labor Commissioners to investigate strikes, lockouts, etc."—Painter.

"Eight hours should constitute a legal day's work in all classes of employment. The abolition of the pernicious system of working people day, night, and Sundays."—Ironmolder.

"Have people avoid debt; leave rum, whisky, and beer alone; attend to the principles of organization and half the battle between capital and labor is won."—Machinist.

"Close all places of business on Sunday, and have uniform hours of work."—Clerk.

"Provide seats for those of us who are compelled to stand from the rising to the setting of the sun, and sometimes to the long hours of midnight."—Saleslady.

"Accept my congratulations for the good work you are doing in investigating the apprenticeship of sewing girls."—Sewing Woman.

"Persevere in your good work, as you have the sympathy and support of all workingwomen."—Mother.

"Ignorance, intemperance, and indifference are the three great obstacles in the way of labor improvement."—Carpenter.

"Coöperative principles and profit sharing should form the basis for labor improvement."—Laster.

"A good State apprentice law is necessary to protect our craft."—Compositor.

"Introduce arbitration and conciliation as the basis of settlement for all industrial disturbances. Strikes are a failure, and should be avoided."—Cook and Waiter.

"A State Arbitration Board is necessary. Strikes have had their day."—Waiter.

"Body and soul is hardly kept together by the pay we receive. Impositions are heaped upon us by the use of the apprentice dodge. Have a special committee appointed by the Legislature to investigate sewing, cloak-making, and millinery establishments."—Sewing Woman.

"Investigate the cloak houses in San Francisco."—Cloak Saleslady.

"Abolish convict and also contract labor by the Government or State. All work should be done by the day, and payments should be made weekly."—Stonecutter.

"Have the hours of labor curtailed and provide a system of profit sharing."—Butcher.

"Make more mechanics, and use less machinery in production."—Machinist.

"Reduce the hours of labor, and pass a law prohibiting children under sixteen years of age from working in factories."—Bagmaker.

"If the manufacture and sale of liquors were stopped, it would materially benefit the wage classes."—Printer.

"Cash for every week in full. An apprentice law compelling employers to teach them the trade in full."—Tanner.

"Stop the employment of Chinese, and drive the curse out of our land."—Wool Sorter.

"Give each employé an interest in the business, so that he will be work-

ing for his own interest. It would materially obviate the present system where it is necessary for the employers to grind the employé."—Glove-maker.

"Have an apprentice law passed and prohibit the importation of alien labor. Foreign mechanics are driving our youth to the wall."—Coremaker.

"The want of confidence in one another is a fault which pervades all classes in the country. It is the main cause of labor troubles."—Pressman.

"The want of organization and the employment of half fledged workmen have reduced our fellow workers to almost starvation wages."—Carpet-layer.

"Investigate the condition of employment offices and look into the half interest swindlers."—Farmer.

"Men lie prone on their backs and expect the golden apple to fall into their mouths."—Rigger.

"American workmen are too greedy for quick fortunes and neglect intellectual culture."—Stairbuilder.

"Keep out the foreign element and give the American youth a chance." Piano Maker.

"We are in need of a good apprentice law, compelling the employer to teach a boy a trade and not use him for personal pecuniary benefit."—Silversmith.

"Equal pay for equal work. The females are underpaid, and consequently throw many of our men out of employment."—Compositor.

"The bureau should persist in its good work of bringing to light the apprentice and half interest swindles."—Printer.

"Establish industrial training schools and attach them to our common schools; have the students make a study of practical heights and practical measurements. I have lived in the country the greater part of my life and know that many men grow up ignorant. I am anxious to see the youth get thoroughly educated."—Carpenter.

"Enforce the eight-hour law. It would afford more time for education."—Carpenter.

"Labor should be entitled to a voice in fixing wages. The man who sells his labor should have a say for what he shall sell it for."—Wage Worker.

"Encourage skilled workmanship. It is a preventive of importation of foreign mechanics."—Workman.

"Teach the rising generation to respect, rather than to despise, manual labor. Our clerk market is overcrowded."—Mechanic.

"Equal laws for all classes."—Engraver.

"Equal pay would drive women out of competition."—Cigarmaker.

"The State should pass a law making fire escapes and protected elevators compulsory."—Factory Hand.

"The Chinese on the Pacific Coast should be supplanted by white labor cigar packers, which would naturally increase a demand for Pacific Coast cigars."—Cigar Packer.

"We would like to have an investigation, by the bureau, into the sleeping accommodations offered by the bosses; many of us have to work twelve to sixteen hours daily in cellars that are unfit for habitation."—Baker.

"We have too much classical education in our schools and colleges. Elevate the technical and depress a little the classical courses. Hundreds of graduates from law schools and colleges are unfit for any kind of employment. They are above manual training and are termed 'gentlemen.' Boys and girls need a thorough practical knowledge which would fit them for some higher station in life than clerks, bookkeepers, lawyers, doctors, etc. Ornamental and decorative art and improved architecture cannot be

acquired by a classical education. A manual and technical school is what is needed to do effective work."—Architect.

"The condition of our women in workshops is deplorable. What is needed is a Workingwomen's Protective Union, such as is in New York. More especially to protect them from frauds heaped upon them by unscrupulous employers and scoundrels. Such a union could often provide shelter for those who are turned upon the streets to starve."—Dressmaker.

"We need the same kind of self government in our schools as was tried by Pestalozzi and by Fellenberg in Switzerland. It should be started in our kindergartens."

PART IV.

APPRENTICESHIP.

CHAPTER I.

DECAY OF APPRENTICESHIP.

Apprenticeship, in the proper sense of the word, no longer exists in America. A boy is no longer led by the hands of his parents to the shop of a master mechanic and there bound under articles duly "signed, sealed, and delivered," to serve his master for five or seven years; and the master is no longer bound to teach his apprentice all the details of his craft under penalties duly "made and provided." The old system is dead and buried in this country, and is on its last legs in Europe. The American boy now generally makes application himself to the proprietor or foreman, and enters upon his so called apprenticeship without any written contract whatever. The term apprenticeship, as now used, is simply a misnomer, for the lad to whom it is applied can go when he pleases and the master is under no obligation to teach him his trade. As a natural result, when a boy gets a smattering knowledge of the business after a year or two of service, he strikes out for himself, because he can get an advance of wages as a helper or unfledged workman.

This decay of apprenticeship is principally owing to the subdivision of labor which now prevails in the manufacture of nearly every article, from a lucifer match to a steam engine. The use of machinery groups workmen into a number of subdivisions or departments in which parts of the article to be manufactured are made. An apprentice is confined to one of these departments and is soon able to earn wages. He usually continues as he began, and instead of learning the craft in all its details, he learns only a small fraction of it. The boy who goes into a watch factory, for instance, may learn how to make a spring, or a hand, or a wheel, but not a watch. Take the manufacture of boots and shoes, and, incredible as it may appear, it is nevertheless the fact, that it is subdivided into so many departments that it takes over ninety separate and distinct terms to denote all their divisions. If a beginner wishes to become master of his trade, he generally finds that it is to the interest of his employer to keep him as long as possible in some one department or subdivision, because he has acquired some knowledge of it and his labor is profitable.

The proprietor of a large dry goods house in San Francisco told me it was his practice, and that of other firms, to keep a boy in one department, and not transfer him to another after he had acquired a knowledge of it, as is the practice in Europe. "We are not bound," said he, "to impart a knowledge of the dry goods business to the boys whom we employ. We pay them wages from the start, and they can leave us without a moment's warning. It is simply a question of dollars and cents on both sides, and if either gets tired of the agreement he is at liberty to break it. Conse-

quently it is a rare exception for a boy to get a thorough knowledge of the business in America, and nearly all our expert buyers and salesmen have been trained abroad."

The workman who understands but one department or subdivision of his trade stands but little chance of bettering his condition. He cannot start into business for himself because his knowledge of it is too limited, and he often finds himself helpless when by some unfortunate turn of events his specialty fails him. But what can a young fellow do who is anxious to master a trade? In factories, or large establishments, he is seldom spoken to by the owner or overseer, and the workman by his side, who is paid by the piece, is too busy to give him instruction. Consequently he has to pick up the business the best way he can. It is no longer the practice for the master to sit by the side of his apprentice and show him how to do the work. I asked a number of young mechanics how they acquired a knowledge of their trade, and the invariable answer was that they picked it up themselves by watching the journeymen at work. They were seldom shown anything by the boss. Oftentimes neither the employer nor his foreman is sufficiently skilled in the trade to be able to instruct others. The crop of unskilled mechanics is therefore on the increase and the demand for thoroughly skilled mechanics was never more urgent, especially in the higher branches. This disregard of the apprenticeship system has filled the trades with incompetent labor, and shows the necessity for the establishment of technical training schools to supply that knowledge which is no longer acquired in the shops, and which the rising generation is sadly in need of. An apprenticeship wherein there is neither obligation to teach nor to learn the trade is one in which the boy is used only as a means of profit without regard for his future, and he finds himself, at the end, only useful in the particular division of the trade in which he has been kept constantly engaged. Sometimes the boy becomes unreasonably puffed up with the conception of his own ability, and breaks away to find cheap employment before he is competent either to direct his course or to discharge his duties as a journeyman mechanic.

One of the first considerations with an employer who takes a lad as an apprentice should be his aptitude for the business. Unfortunately, in nearly all cases, this important phase of the question is entirely ignored by the manager or overseer, who is usually responsible for such matters. Formerly, when employers had in every case a thorough technical knowledge of their trade, considerable care was exercised with respect to the tuition of apprentices. Now, however, employers are frequently non-practical men, who take little or no interest in the details of their business.

The employer who takes a lad as an apprentice undertakes a very grave responsibility, and if as much care were now taken as formerly in training apprentices, the necessity for a technical education would be reduced to a minimum. So important a matter is this, that in my opinion the Legislature should impose a very heavy penalty upon an employer who fails to carry out his contract with an apprentice.

LAWS RELATING TO APPRENTICES.

To all who have given the subject any consideration, the need of a better apprenticeship law than the one we have in this State is evident. The present law provides that the employer, or master, "will cause such a child to be instructed to read and write and to be taught the general rules of arithmetic," but does not contain any clause or word obligating him to teach the minor a trade. It is folly to call it an apprenticeship law at all,

for it reads as if it were intended only for the waifs and vagrants who were likely to become dependent upon the charity of the public.

The following is the text of the so called apprentice law of California:

CIVIL CODE OF CALIFORNIA—TITLE IV—MASTER AND SERVANT.

SECTION 264. Every minor, with the consent of the persons or officers hereinafter mentioned, may, of his own free will, bind himself, in writing, to serve as clerk, apprentice, or servant, in any profession, trade, or employment, during his minority; and such binding shall be as valid and effectual as if such minor was of full age at the time of making the engagement.

SEC. 265. Such consent shall be given:

1. By the father of the minor. If he be dead, or be not of legal capacity to give his consent, or if he shall have abandoned or neglected to provide for his family, and such fact be certified by a Justice of the Peace of the township or county, or sworn to by a credible witness, and such certificate or affidavit be indorsed on the indenture, then:

2. By the mother. If the mother be dead, or be not of legal capacity to give such consent or refusal, then:

3. By the guardian of such infant. If such infant have no parent living, or none in a legal capacity to give consent, and there be no guardian, then:

4. By the Supervisors of the county, or any two Justices of the Peace, or the Judge of the Superior Court of the county.

5. If such minor be an orphan, under the care and control of any orphan asylum in this State, then by the Board of Managers thereof.

SEC. 266. Such consent shall be signified in writing by the person entitled to give the same, by certificate at the end of, or indorsed upon the indentures.

SEC. 267. The executors of any last will of a parent, who shall be directed in such will to bring up his or her child to some trade or calling, may bind such child to service as a clerk, or apprentice, in like manner as the father might have done if living. If there is a surviving mother, her consent also is necessary.

SEC. 268. The Supervisors of the county may bind out minors who are, or shall become chargeable to such county, to be clerks, apprentices, or servants, which binding out shall be as effectual as if such minors had bound themselves with the consent of their father.

SEC. 269. In every town or city the presiding officer of the first council or legislative board thereof, if there be more than one, or any public officer or officers appointed to provide for the poor, may in like manner bind out any child who, or whose parents are, chargeable to any such town or city.

SEC. 270. The age of every infant so bound shall be inserted in the indentures, and shall be taken to be the true age; and whenever public officers are authorized to execute any indentures, or their consent is required to the validity of the same, it shall be their duty to inform themselves fully of the infant's age.

SEC. 271. Every sum of money paid or agreed for, with or in relation to the binding of any clerk, apprentice, or servant, shall be inserted in the indentures.

SEC. 272. The indenture shall also contain an agreement on the part of the person to whom such child shall be bound, that he will cause such child to be instructed to read and write, and to be taught the general rules of arithmetic, or, in lieu thereof, that he will send such child to school three months of each year of the period of indenture.

SEC. 273. The counterpart of any indenture executed by any county, or city, or town officers, must be by them deposited in the office of the County Clerk.

SEC. 274. Any minor, capable of becoming a citizen of this State, coming from any other country, State, or Territory, may bind himself to service until his majority, or for any shorter term. Such contract, if made for the purpose of raising money to pay his passage, or for the payment of such passage, may be for the term of one year, although such term may extend beyond the time when such person will be of full age, but it shall in no case be for a longer term.

SEC. 275. No contract made under the preceding section shall bind the servant, unless duly acknowledged by the minor before some public magistrate or other officer authorized to administer oaths, nor unless a certificate showing that the same was made freely, on private examination, be indorsed upon the contract.

SEC. 276. Such indentures of apprenticeship may be annulled for:

1. Fraud in contract of indenture;

2. When such contract is not made or executed in accordance with the provisions of this title;

3. For willful non-fulfillment, by such master, of the provisions of such indenture;

4. Cruelty or maltreatment of such apprentice by the master. In such case the apprentice may recover for his services.

APPRENTICE LAWS AND REGULATIONS.

A properly framed apprentice law should guard scrupulously both the interests of the employer and the apprentice. It should compel the former to have the boy or girl committed to his care properly instructed in the trade, and oblige the latter to conform to reasonable rules and regulations.

An apprentice law in our day could not be hedged around with the stringent obligations and restrictions of old time laws upon the subject. It should be plain, simple, and to the point. Such a law would be favored by all conscientious employers, and would receive the hearty approval of nearly all trade organizations.

Many of the officers of trades unions have been asked their views in this connection by the bureau, and without exception they have expressed themselves in favor of a good apprentice law. The Carpenters and Joiners in the preamble to their constitution say that for "want of a strict apprentice system the trade literally swarms with unskilled men." Their General Executive Board adopted the following resolutions at a meeting held in Philadelphia, February 26, 1887:

CARPENTERS AND JOINERS RULES REGARDING APPRENTICES.

WHEREAS, The rapid influx of unskilled and incompetent men in the carpenter trade has had, of late years, a very depressing and injurious effect upon the mechanics in the business, and has a tendency to degrade the standard of skill and to give no encouragement to young men to become apprentices and to master the trade thoroughly; therefore, in the best interests of the craft, we declare ourselves in favor of the following rules:

SECTION 1. The indenturing of apprentices is the best means calculated to give that efficiency which it is desirable a carpenter should possess, and also to give the necessary guarantee to the employers that some return will be made to them for a proper effort to turn out competent workmen; therefore, we direct that all local unions under our jurisdiction shall use every possible means, wherever practical, to introduce the system of indenturing apprentices.

SEC. 2. Any boy or person hereafter engaging himself to learn the trade of carpentry shall be required to serve a regular apprenticeship of four consecutive years, and shall not be considered a journeyman unless he has complied with this rule, and is twenty-one years of age at the completion of his apprenticeship.

SEC. 3. All boys entering the carpenter trade with the intention of learning the business shall be held by agreement, indenture, or written contract for a term of four years.

SEC. 4. When a boy shall have contracted with an employer to serve a certain term of years, he shall on no pretense whatever leave said employer and contract with another, without the full and free consent of said first employer, unless there is just cause, or that such change is made in consequence of the death or relinquishment of business by the first employer; any apprentice so leaving shall not be permitted to work under the jurisdiction of any local union in our Brotherhood, but shall be required to return to his employer and serve out his apprenticeship.

SEC. 5. It is enjoined upon each local union to make regulations limiting the number of apprentices to be employed in each shop or mill to one for such number of journeymen as may seem to them just; and all unions are recommended to admit to membership apprentices in the last year of their apprenticeship, without the privilege of voting and exempt from the payment of dues for that year, to the end that, upon the expiration of their terms of apprenticeship, they may become acquainted with the workings of the union and be better fitted to appreciate its privileges and obligations upon assuming full membership.

OPINIONS CONCERNING AN APPRENTICESHIP LAW.

In a circular addressed to a large number of teachers, journalists, manufacturers, merchants, tradesmen, master mechanics, and artisans generally, the question was asked: "Do you favor an apprenticeship law, and for what reason?" At least 90 per cent of the returns from mechanics were in the affirmative, but opinions pro and con among the other classes referred to were about equally divided.

School Superintendent W. A. Kirkwood, of Contra Costa, replies: "I do. To cure our youth of instability and fickleness. Also to make them thorough in their trades."

School Superintendent S. G. Wright, of Del Norte County, answers: "Yes, because it would compel a continuity of effort on the part of the minor, till at least a fair knowledge or manual dexterity is gained. Especially is this available for the fathers of unruly boys."

School Superintendent J. H. Shannon, of Inyo County, replies: "I do

favor any law by which our boys can be enabled to learn trades when their inclinations lead them to such a course; further, I feel that the rising generation should be taught some trade or branch of business, thus enabling them to be self-supporting."

School Superintendent Myra A. Parks, of Lassen County, says: "I do not favor an apprenticeship law," but gives no reasons.

School Superintendent A. J. Tiffany, of Nevada County, replies: "I do. As it is now our boys are shut out from learning trades by the Trades Unions."

School Superintendent W. W. Armstrong, of San Luis Obispo County, says: "The enactment of an apprenticeship law would certainly lead to elevating the standard of skilled labor, and would in time do much toward a satisfactory solution of the mixed problem of labor; but the limits of this communication precludes a discussion of the subject in all its bearings."

Professor Charles H. Allen, Principal State Normal School of San José, replies: "Yes; by all means. Now, no one will take a boy to learn a trade, for as soon as the boy has had a little training, away he will go and set up for a journeyman. If by any means a boy can find a place, he is for years kept at the simplest part of the work, where he can learn the least, for fear of the result just named. An apprentice who is bound for a term of years would, on the contrary—were his employer assured of his remaining in service through the term—be put at the most paying part of the work, and would, early in his apprenticeship, be more skillful, so he could learn more and thus in the end would become a better artisan. The result of the apprentice system is better seen in our foreign workmen as contrasted with our native artisans."

School Superintendent H. R. Given, of Trinity County, replies: "Yes; I think it produces better workmen."

School Superintendent G. P. Morgan, of Tuolumne County, answers simply: "No."

Professor William M. Friesner, of Los Angeles, also answers: "No."

In the course of the several investigations into labor grievances conducted by this bureau, the question was asked of a large number of witnesses, both employers and workmen, "Are you in favor of an apprentice law?" And the answer, in almost every instance, was in the affirmative. Especially was this the case during the printers' investigation held in San Francisco and in Oakland. It will be seen by the testimony published elsewhere that all parties concerned were in favor of an apprentice law.

EMPLOYERS CONTRACTS OR AGREEMENTS WITH APPRENTICES.

In the absence of any well defined apprentice law on our statute books which would regulate the respective duties and obligations between employers and minors, the former are at liberty to prescribe for both. This does not trouble the apprentice much, for he knows he is at liberty to refuse the dose when it suits him.

In many establishments a boy or girl, upon first entering, is required merely to enter his or her name upon a register, which may or may not contain articles of agreement, for all the apprentice knows.

In some, employers require their apprentices to sign a form like this:

AGREEMENT.

— — —, 188—.

The undersigned hereby agrees to work for — — — upon the following terms, viz.:

First—I am to make myself useful in any department whenever and wherever directed by said — — —, and am in all things to obey their directions, and their rules and regulations.

Second—I am to receive pay at the rate of —. My salary to commence from the day and hour when I first report at the time-room. All absent time, other than that allowed for meals, to be deducted from salary.

Third—I am to be discharged by said — — whenever in their judgment they deem me incapable of performing the work as they desire.

Name —. Address —. Refers —. Last employed —.

THE UNION IRON WORKS APPRENTICES.

The Union Iron Works, of San Francisco, which gives employment to an immense force of mechanics, receives apprentices under the following conditions:

Boys will be received either as ordinary apprentices, to serve four years in one department, or as engineer apprentices, to serve six years—two years on machines, one year in the pattern shop, one year erecting, and two years in the drafting room.

Ordinary apprentices will be received in the following departments: As machinists, including erecting; as patternmakers; as blacksmiths; as molders, and as boiler and plate workers.

No boy will be received under sixteen years or over eighteen years in the machine, patternmaker, blacksmith, or molder departments; nor under fifteen or over seventeen years of age in the boiler and plate works, including shipwork.

Boys in all departments will be taken on thirty days' trial, in order to satisfy themselves that they have made a proper choice, after which they will be required to register themselves as regular apprentices, by their parents or guardians in their behalf, and by themselves in their own behalf, all of which signatures will be considered as evidence that all the conditions herein named are understood and accepted by all parties interested.

For machinist and patternmaker apprentices the parent or guardian will be required to deposit \$50 with the company, as a guarantee of the good behavior of the boy. The company will also deposit \$50 to the credit of said boy, said \$100 to be paid to the boy on the completion of his apprenticeship.

For molders, blacksmiths, and plateworkers, the company will make the deposit of \$50 to the credit of the boy, to be paid to him on completion of his apprenticeship.

Ordinary apprentices' wages shall be: First year, \$4 per week; second year, \$5 per week; third year, \$6 per week; fourth year, \$8 per week; three hundred full days must be worked to complete any one year.

Engineer apprentices will be received between the ages of fifteen and seventeen years, for a term of six years, as already set forth. The parent or guardian will be required to deposit \$100 as a guarantee of good faith. The company will also deposit \$100 to the credit of said boy. Said \$200 to be paid to the boy on completion of his apprenticeship.

Engineer apprentices' wages shall be: First year, \$4 per week; second year, \$5 per week; third year, \$6 per week; fourth year, \$7 per week; fifth year, \$8 per week; sixth year, \$9 per week; three hundred full days must be worked to complete any one year.

APPRENTICE LAWS AND AGREEMENTS.

The absence of a properly framed apprentice law on our State books affords scope for wily, designing employers to draw up indentures to suit themselves, wherein their own interests are looked out for most assiduously, but those of the boy and girl completely overlooked. Here is a sample from a San Francisco firm employing from fifteen to twenty apprentices:

The said parties of the second part hereby agree to instruct the party of the third part in the business of —, through their employes, and not individually or personally; and reserve the right to discharge said — — from their employment, under this indenture, and avoid this instrument at any time during said term, on account of any of the causes hereinafter specified; in which case the sum reserved from said wages, as hereinafter specified, shall be forfeited, as hereinafter expressed; and if such discharge shall occur during any part of a month, they shall pay only for the portion of said month served by him, according to said terms; and the said parties of the first and third parts hereby consent hereto.

It is further stipulated and agreed, that the wages as hereinbefore expressed are so fixed upon the express condition and consideration that the said — — shall remain and continue in said service and employment for and during the full term of — years next ensuing from the date hereof; and shall not leave or depart from said service or employment before the expiration of said term of his own will, or by the will, command, or direction of said party of the first part, as hereinbefore expressed; and it is stipulated and agreed that the said parties of the second part shall reserve and keep back from and out of the monthly wages to be paid, as hereinbefore expressed, the following proportion monthly, to wit: the sum of ten per cent thereof; and at the expiration of said term, if

said — — shall not have been discharged, but shall have continued and then still be in said service and employment, the said entire amount so reserved and kept back shall be paid to him; but no interest shall accrue or be payable thereon.

If the said — — should voluntarily quit said service and employment before the expiration of said term, as herein expressed; or should leave by command or direction of said party of the first part, or any other person or persons, before the expiration of said term; or should be discharged for any of the causes hereinafter specified, the wages to be paid shall be the respective sums as hereinbefore expressed, with the said reserved sums deducted therefrom, and no more; and in that case, no claim shall exist against said parties of the second part for said sums reserved and kept back, as aforesaid.

The said — — shall conform to all the rules and regulations now in force in the work-room of said parties of the second part, and to such changes as may hereafter be made therein; and shall faithfully and diligently perform all lawful work and labor in and about said employment that may be required of him; and obey all lawful directions of said parties of the second part, within the scope of his employment; and a failure, neglect, or refusal of said — — to conform to said rules and regulations, and the changes thereof that may hereafter be made, and to perform said work and labor, or to obey said directions or any of them, shall be just cause for his discharge from said employment, and for the forfeiture of said reserved pay, as hereinbefore expressed.

It is further stipulated, that the wages herein agreed to be paid to said party of the first part, may be paid to said — —, and his receipt therefor shall be a full discharge thereof to said parties of the second part.

The said — —, of his own free will, consents hereto, and agrees faithfully and honestly to serve said parties of the second part in said employment, for and during said full term of — — years next ensuing from the date hereof; upon the terms, and subject to all the conditions, reservations, and forfeitures, as hereinbefore expressed.

And the said party of the first part hereby covenants that the said — — shall continue in said employment for and during said full term of — — years next ensuing from the date hereof; and shall, during said time, conform to all the rules and regulations as hereinbefore specified; and shall perform all lawful work and labor that may be required of him; and shall obey all lawful directions of said parties of the second part, within the scope of his said employment; and that he shall not voluntarily quit said employment until the expiration of said term.

In former years an apprentice was placed under the care of a journeyman, who was responsible to his master for his proper tuition, and who was remunerated for the extra trouble and loss of time occasioned. At the present time, however, apprentices are left to pick up the trade the best way they can, being used by the employers solely for the purpose of profit, and kept to the purely mechanical portion of trade; often used as errand boys, instead of being thoroughly taught the various technicalities connected therewith, by which means alone they can ever hope to raise themselves above the common level or become thoroughly competent workmen.

The Missouri Bureau of Labor Statistics, in discussing the decadence of genuine apprenticeship and trade learning, says:

The disappearance of the apprentice system has tended to foster a natural vanity, which we see illustrated daily, in the desire to bring up one or two sons of a family to be a clerk or a bookkeeper, or to follow some other "genteel occupation," of which clean hands, and nice clothes, and a "respectable appearance" are the concomitants. The number seeking clerkships appears to be proportionally greater each year, and because people will so numerous seek this kind of employment by which to live, and fail to realize their hopes, it becomes one of the sources of the genteel pauperism which is beginning to make its appearance among us. It is asserted by some well informed and close observers that the majority of tramps, paupers, and criminals is drawn from the class that starts out in life as clerks, bookkeepers, and followers of other "genteel occupations," a few from among the ranks of skilled mechanics.

The data furnished in the report of the State Prison Directors of California for the year 1887, do not corroborate this assertion, for the number of clerks and bookkeepers in our two State Prisons amounts only to thirty-seven out of a total of eighteen hundred and twenty-seven prisoners. But when it comes to the question of "How many of these prisoners have been brought up to a trade?" State Prison statistics prove that an overwhelming majority have not learned to employ themselves usefully in any particular occupation where skill or experience is required.

APPRENTICESHIP—PRISON STATISTICS.

Captain Charles Aull, Warden of the State Prison at Folsom, says: "It is a safe estimate that 75 per cent of the criminal element proper has been brought into a life of crime by the utter neglect of proper care and training in youth."

The following table shows the number of convicts claiming to be mechanics at the time they were received into the State Prison at San Quentin, and their occupation, collated from the Warden's report for 1887:

TABLE W.

Mechanics at San Quentin Prison.

OCCUPATION.	Number.	OCCUPATION.	Number.
Baker	9	Iron worker	1
Blacksmith	18	Molder	3
Brick mason	4	Machinist	15
Boilermaker	5	Mattressmaker	1
Bolt cutter	1	Millwright	2
Buttonmaker	1	Printer	13
Boxmaker	1	Plumber	2
Blockmaker	1	Painter	22
Brewer	3	Porter	1
Bookbinder	1	Photograph painter	1
Carver	4	Polisher	1
Carpenter	32	Pianomaker	1
Cigarmaker	24	Roller	1
Cabinetmaker	6	Ship carpenter	4
Cooper	2	Sashmaker	3
Chairmaker	2	Stonecutter	4
Carriagemaker	1	Shoemaker	27
Dyer	1	Sailmaker	1
Engineer	14	Spinner	1
Electrician	1	Sticker and planer	1
Furniture polisher	1	Tailor	10
Foundryman	4	Tinsmith	6
Filer and sawyer	2	Tanner	2
Gardener	4	Upholsterer	2
Gasfitter	3	Weaver	2
Glovemaker	1	Wheelwright	1
Harnessmaker	15	Watchmaker	1
Horseshoer	3		
Hatter	1	Total	294

The total number of prisoners was one thousand two hundred and twenty, which shows that 24.09 per cent, or less than one fourth, were skilled artisans, including proficient, fair, and poor.

The number of laborers is given as three hundred and seventy-six; bar-keepers, ten; hostlers, twenty-two; herders, three; teamsters, thirty-one; vaqueros, thirty-seven; washmen, seventy-three; waiters, seventeen; sailors, thirty-four; miners, twenty-five; brakemen, seven; firemen, seven; stevedores, six; railroad employés, six; quarrymen, two; making a total of convicts who may be classed as unskilled, of six hundred and fifty-six, or more than half the entire number of convicts. There were twenty under the heads of clerk and bookkeeper.

The educational abilities of the prisoners are given as follows:

Read and write	808
Read and cannot write	77
Neither read nor write	335
Total	1,220

So that while nearly two thirds of the convicts can read and write, not one half have learned a trade, and less than one fourth are mechanics.

The following table shows the number of mechanics under the headings of "proficient," "fair," and "poor," in the State Prison at Folsom, according to the Warden's report for 1887:

TABLE X.
Mechanics at Folsom Prison.

OCCUPATION.	Profi- cient.	Fair.	Poor.	Total.
Baker	2	4	1	7
Blacksmith	7	4	1	12
Broommaker	1			1
Boilermaker	2		1	3
Bookbinder			1	1
Bootmaker		1		1
Bricklayer	2	1		3
Buttonmaker		1		1
Cigarmaker	2	1		3
Carpenter	5	3	7	15
Cabinetmaker	1		1	2
Chairmaker		1		1
Carriage body maker		1		1
Civil engineer	1			1
Engineer	3	3	1	7
Engineer and interpreter	1			1
Gardener	3	2	1	6
Glass blower		2		2
Gasfitter		1		1
Horseshoer	1	2		3
Harnessmaker	1	3		4
Iron bridge builder		1		1
Locksmith		1	1	2
Lead smelter		1		1
Molder		2		2
Millwright			1	1
Marble cutter	1			1
Machinist	1	4		5
Painter	5	9	2	16
Pipemaker		1		1
Printer	1	2	1	4
Plumber		1	2	3
Plasterer	1			1
Pressman		1		1
Paper decorator		1		1
Stonecutter		2		2
Saddler	1			1
Sawyer		1		1
Stonemason	1			1
Sailmaker		4		4
Shoecutter		2		2
Shoemaker	5	7	3	15
Shoe fitter	1			1
Silver smelter			1	1
Tailor	2	5	4	11
Tinsmith	3	1		4
Turner		1		1
Tanner			1	1
Tool dresser			1	1
Upholsterer	1	1		2
Weaver	1			1
Wood carver		1		1
Totals	56	79	31	166

The total number of prisoners was six hundred and seven, so that only about 9 per cent were "proficient" mechanics, 13 per cent "fair," and 5 per cent "poor;" making a total of 27 per cent who had learned a mechanic's

trade. There were one hundred and thirty-eight convicts classed as common laborers: no occupation, five; cooks, forty-nine; hostlers, thirteen; laundrymen, eighteen; waiters, thirty; sailors, seventeen; barkeepers, seven; boatmen, three; brakemen, two; bootblack, one; book agent, one; firemen, seven; joekeys, two; peddler, one; quarryman, one; railroad employees, four; ragpickers, two; servant, one; stewards, two; soldiers, two; herder, one; sport, one; saloon keeper, one; vaqueros, five; valet, one; wool-washer, one; wood choppers, two; watchman, one; making a total of unskilled laborers of three hundred and nineteen, or more than half the total number of convicts. There were seventeen under the head of clerks and bookkeepers.

Under the head of "ability to gain a livelihood," three hundred and sixty-four are put down as able to earn less than a dollar per day.

The number of prisoners able to read and write.....	417
Able to read only.....	117
Illiterate.....	71
Total.....	605

In Folsom Prison, therefore, more than two thirds of the convicts can read and write, while less than one fourth are "proficient" and "fair" mechanics. These statistics from Folsom Prison are almost on a par with those given from San Quentin, and prove that it is not so much ignorance, as the want of knowing a trade, which leads to crime.

Taking the two prisons together, it will be seen that while only about 22 per cent of the convicts are illiterate, more than 53 per cent have not been brought up to a trade.

The cost of maintaining the prisoners at San Quentin for the year ending June 30, 1887, was \$158,722 58, or at the rate of \$10 86 per month for each prisoner. The cost at Folsom was \$108,732 09, or at the rate of \$12 47 per month for each prisoner, making a total cost for the support of the State prisoners of \$267,454 67.

If we take the number of prisoners given above as the average throughout the year, the cost of maintenance per head would be \$146 38 for the year, or \$12 20 per month.

The State apportionment per census child for teaching the children of the State in our public schools for the year 1886 was \$7 92, or at the rate of 66 cents per month. It costs the State, therefore, more to support one criminal than to teach eighteen children.

In an article in the "Journal of Industrial Education," the following facts from the pen of Mr. Ethelbert Stewart throw further light upon this important subject:

Of the five hundred and fifty-two convicts received into the Eastern Penitentiary, of Pennsylvania, in 1886, four hundred and seventy-seven had a "fair common school education"—and that proportion seems typical. Not that they have not been to Sunday school; of the five hundred and sixty-four convicts received in the same prison in 1885, five hundred and fifteen had been Sunday school scholars for longer or shorter times. Not that they are intemperate; of the five hundred and fifty-two, one hundred and four were total abstainers, and of the five hundred and sixty-four, ninety-nine were total abstainers. The most common, the most generic fact, is that *the convicts know no trade*. Of those five hundred and fifty-two, thirty-nine had learned a trade by apprenticeship; ten had been apprenticed, but had left before finishing; sixty-two had "picked up a trade or two by working at them," leaving four hundred and forty-one "entirely ignorant of trade knowledge." Of the five hundred and sixty-four received the year before, four hundred and fifty-nine had no trade knowledge. Of the four hundred and sixty-one convicts received in 1884, three hundred and sixty-one had no trade knowledge. Of the four hundred and seventy-one male prisoners received in 1883, three hundred and seventy-eight had never learned a trade. Between 1876 and 1885, this Pennsylvania penitentiary received, in all, ten hundred and sixty-nine convicts under twenty-one years old; of these, eight hundred and sixty-four had fair common school learning, but nine hundred

and ninety-three had never learned a trade. Of the fourteen hundred and ninety-four convicts in the Joliet Prison, Illinois, one hundred and fifty-one are "illiterate;" one hundred and twenty-seven can read, but not write; ten hundred and eighty-seven have fair education; one hundred and twenty-nine are college graduates. Of the same number, four hundred and thirteen are classed as "intemperate;" seven hundred and sixty-four as "moderate drinkers;" three hundred and seventeen as "total abstainers." Of the six hundred and sixty-eight received at Joliet between October and October, 1885-6, four hundred and seventy-eight had no trade knowledge. Chicago spends yearly \$18 93 for each pupil in her public schools; it costs her \$33 per arrest for each of her forty-four thousand two hundred and sixty-one arrests made in 1886, and the City of Chicago never expended a dollar to teach a boy a trade. London pays from the city treasury \$335,000 a year toward the support of trade schools, and (Mr. Stewart asks), "May there not be some connection between this fact and the fact that in 1883 there was in London but one arrest for each forty-eight of the population, while in New York, during the same year, there was one arrest to each twenty-one of the population; in Brooklyn, one to twenty-three; in St. Louis, one to twenty; and in Chicago, one to fifteen?"

Statistics compiled in recent years in Massachusetts show that out of seventeen hundred and twenty-seven male adult paupers in that State, when the returns were tabulated, eight hundred and eighty-seven, or more than one half, had not learned a trade, and that but few of the remainder had attempted to serve an apprenticeship; in fact, that the majority had never learned how to make a living by honest labor. A further return showed that of four thousand three hundred and forty convicts, two thousand nine hundred and ninety-one, or 68 per cent, had never a trade or fixed occupation; and of two hundred and twenty committed to a certain prison in one year, one hundred and forty-seven were without a trade or any regular means of earning a living. In another State, out of three hundred and seventy-three prisoners committed in one year, two hundred and eighty-four had no fixed occupation.

APPRENTICESHIP ADVERTISEMENTS.

All boys cannot follow a professional or clerical course, even if every boy had the means to do so. Thousands of boys and girls are daily seeking to learn trades in the face of obstacles encountered from every quarter. Read the want columns in the daily newspapers and such insertions as the following will invariably meet the eye:

STEADY, INTELLIGENT CARPENTER, AGED TWENTY-TWO, WISHES TO learn patternmaking; low wages to start.

YOUNG BOY WISHES SITUATION AS CASH-BOY OR TO LEARN BARBER trade.

STRONG, STEADY BOY OF SEVENTEEN, WISHES ANY KIND OF WORK OR to learn a good trade.

BOY FIFTEEN YEARS OLD WOULD LIKE TO LEARN A TRADE FOR A home.

If boys are debarred from learning a particular trade, then "to learn any kind of a trade" is the next desperate resort. Advertising for a chance to learn a trade is usually the last hope of a boy or girl, and is not tried until the efforts to obtain a place through the aid of friends and one's own exertions have failed. In a rapidly developing country, where trade of all kinds is brisk, where immigration is desired, and where "help" is in demand, it is astonishing to think that an intelligent boy or girl, willing and able to work, should have any difficulty in finding a place in which to learn a trade. And yet there is no doubt that such is the fact. Collected from one of the San Francisco daily newspapers, the following table shows the number applying for places in a few occupations for the year ending July 31, 1888:

TABLE Y.

Apprentices Applying for Places—Showing the Trade, Number of Applicants, and Month of Advertisement.

OCCUPATION.	1887.					1888.							Total
	August	September	October	November	December	January	February	March	April	May	June	July	
Barber	3	3	3		3	2		2				2	18
Blacksmith	1		1				2	1				1	6
Butcher		2						1			8		11
Bartender		2											2
Carpenter	2	2	2	2	1	2				1	2		15
Cigarmaker	1	1		1	1	1							5
Dry goods			1	2		1	2					1	7
Hardware	1					1							2
Machinist				1		1						1	3
"Any kind of a trade"	1		2	2	2	5	1	2	1	4	6	2	28
Printing					1	1						1	2
Plumbing					1	3		1		1			6
Patternmaker									1				1
Photography		1											1
Shoemaking	2					1		3				1	7
Tinsmith						1							1
Waiter		2		2		1		1				1	7
Upbolstering		2		1				2		1			6
Total													128

FOREIGN SUPPLY OF MECHANICS.

American youths are not without ambition, but have not the proper facilities for acquiring a trade and the encouragement to learn one. In this connection the report of the New York Bureau of Labor Statistics contains some surprising statements, which it seems difficult to believe, although the evidence seems well established by sworn testimony. "Our supply of native mechanics," says Commissioner Peck, "is daily augmented by the skilled labor of Europe, and while this foreign element is not equal to the skilled labor which is retained in Europe, is in the main vastly superior to that produced in our own country. Whether unrestricted foreign immigration be or not a national blessing may be disputed, but a visit to the workshops of the State will demonstrate the truthfulness of the statement that the large majority of our tradesmen and mechanics are foreigners. Indeed, in many trades and industrial establishments, there is not a single American at work. The presence of so large a number of foreign born workers means the exclusion of American labor." Another point he made is that "most of the boys and young men learning trades were either foreign born or sons of foreign workers." Commissioner Peck also says that the figures and facts collected by him show that our artisans are not able to compete successfully with the artisans of other countries.

A loud cry has been raised, and very properly so, against the importation of pauper and contract labor from Europe. Congress has taken the matter in hand, and a Commission has been appointed to inquire into the evils arising from such unrestricted immigration. But while adopting measures against the indiscriminate pouring in of *unskilled* labor, have we not reason to take some steps to protect ourselves against the *skilled* labor

of Europe? The best of European mechanics do not emigrate to this country. The best in any country do not leave it, for they are generally well paid and are content with their lot. It is a fact, nevertheless, that while we are napping or indifferent to the question of "How shall our boys become skilled workmen?" the nations abroad are awake and in earnest.

France, England, and other European countries are now engaged in a contest as to whom shall be awarded the palm for excellence in skilled workmanship. Technical training schools are being widely established in those countries. One of the leading statesmen of England, Lord Hartington, speaking of the necessity of promoting technical education in Great Britain, said "it was not a matter of choice but of necessity" with them to educate labor, in consequence of what was being done in other countries in the same direction.

Here in California, so far removed from the *entrepot* of European labor, the proportion of foreign born skilled mechanics to the native is more evenly balanced than in New York.

The crowded out native in the East "pulled up his stakes," gathered together his tools, and struck out for the far West. It takes a considerable amount of money for a mechanic to pay his way to California, and the result is, we have not so many European mechanics in proportion to the native born as can be found in eastern cities.

On the other hand, this has been the dumping ground for the Asiatic coolie, whose blighting influence upon the social, moral, and industrial affairs of our people has been shown up in the previous reports of this bureau. One of the worst effects which the Chinese immigration has had on the laboring part of the population of California, as pointed out in an address from the Federated Trades, lies in the fact that it has degraded certain branches of labor, so that no white man or woman can now resort to them for their sustenance, without being driven thereto by extreme necessity. The industrial pursuits in which Chinese are mostly engaged are, in making cigars, shoes, slippers, trunks, bags, brooms, shirts, ladies' underwear, and gentlemen's goods. They can also be found working, though not extensively, as tailors, tinsmiths, candlemakers, boxmakers, brickmakers, harness and collar makers, dairymen, expressmen, miners, butchers, fishermen, and laundrymen. They are occupied in the houses as domestics, on the farms, in the vineyards, orchards, vegetable gardens, hop yards, and strawberry gardens.

Many large farms and vineyards in California are worked entirely by Chinese on the contract system. In smaller places, the Chinese have introduced a system of hiring themselves out for a short, stated time. To compete with this, the white man has had to adopt the same system, and this renders the hope for him to obtain permanent employment almost nil. He takes his blanket with him and sleeps on the ground or in the poorest kind of an outhouse. Where blooming villages should have sprung up, we find acres and acres devoid of houses, and, what is worse, there is scarcely a town which has not its secluded spot, its wash house, or similar place, sheltering a filthy band of Asiatics.

CHAPTER II.

NATIVE AND FOREIGN BORN MECHANICS.

Entirely omitting Chinese, I deemed it a matter of considerable interest and instruction to ascertain approximately the nativity of the workingmen of San Francisco, in order to see how we compare with New York as regards the proportion of native to foreign born mechanics. To get at reliable statistics as to the nationalities of the different classes of mechanics is impossible, except by means of a census. The register of voters in San Francisco gives the occupation and place of nativity of every registered voter, and tables are herewith submitted, collected from the register of 1886, showing the total number in each occupation, and the total number of native and foreign born skilled mechanics. It must be taken into consideration that there are many foreign born skilled mechanics who are either not citizens or have not registered. Many of the trades unions require their members to become citizens if they are not so when they join the union, but no reliable data could be obtained by me as to the number of non-voters and absentees from registering. In scanning the table of occupations it is well to bear in mind that cognate occupations must be considered together in order to ascertain the whole number. For instance, clerk, bookkeeper, accountant, auditor, and secretary, should be added together. So with compositor and printer, barkeeper and saloon keeper, editor and journalist. Take the number of brass molders, which is given at four, and it would at once suggest itself that this is an error, as there must be a far larger amount. The reason why the number is not larger is because the other voters of that trade when asked their occupation simply gave that of "molder," leaving out the "brass." Coffin makers, of whom there are only two, put themselves down as carpenters or cabinetmakers. Clothiers, who number only eight, are put down as merchants, and so on. Under the designation of merchant a host of occupations is covered, and that is the reason the number is so large—two thousand one hundred and nine. The word "laborer" also embraces a great number of unskilled occupations under many technical names.

TABLE Z.

Table showing the Occupations of Voters Registered in San Francisco, 1886.

Architect	53	Bookkeeper	991
Assayer	39	Bellman	16
Agent	331	Baker	293
Auditor	1	Brass finisher	66
Actor	70	Bank teller	16
Asphaltum	8	Bartender	508
Artist	44	Baggageman	5
Army officer	2	Bookbinder	76
Auctioneer	34	Bookseller	15
Armorer	4	Boilermaker	286
Apprentice	2	Boat builder	25
Blacksmith	633	Basketmaker	4
Butcher	763	Boarding house	22
Barber	450	Brewer	134
Beltmaker	8	Brush manufacturer	27
Brakeman	13	Bottler	16
Boxmaker	89	Boot treer	3
Bill poster	9	Bridge builder	4
Banker	32	Bolt cutter	7
Broker	115	Band sawing	6
Bricklayer	186	Boatman	61

TABLE Z—Continued.

Butler	14	Cidermaker	4
Bagmaker	8	Civil engineer	35
Brass polisher	5	Candlemaker	2
Bag cutter	2	Combmaker	2
Blockmaker	4	Carriage trimmer	30
Bootblack	38	Driver	192
Blindmaker	2	Distiller	13
Bottlemaker	2	Dishwasher	6
Bag sewer	6	Druggist	224
Broommaker	12	Driller	6
Billiardmaker	2	Draughtsman	51
Bracketmaker	6	Dentist	119
Brickmaker	5	Drayman	121
Brassmolder	4	Dyer	28
Bronzer	9	Detective	11
Carpenter	1,827	Doorkeeper	6
Clerk	3,932	Dairyman	254
Coffinmaker	2	Designer	4
Chemist	26	Dressmaker	7
Commission merchant	59	Decorator	11
Coal dealer	133	Dancing master	4
Chipper	2	Diver	2
Cooper	225	Drover	19
Coachman	100	Dresser	6
Currier	35	Editor	16
Cashier	67	Engraver	41
Chairmaker	9	Engineer	768
Calker	141	Expressman	322
Cabinetmaker	168	Electrotypist	8
Canvasser	55	Electroplater	17
Cook	361	Electrician	29
Confectioner	63	Fringemaker	4
Cork burner	4	Flour dealer	1
Contractor	372	Furniture dealer	46
Clothier	8	Finisher	64
Collector	225	Farmer	141
Commercial traveler	149	Florist	34
Cigarmaker	194	Framemaker	34
Cigar dealer	118	Foreman	140
Capitalist	323	Felter	1
Caterer	8	Fireman	245
Collarmaker	18	Fruit dealer	90
Canner	9	Fisherman	90
Coremaker	9	Foundryman	38
Chaplain	2	Fire patrol	5
Coppersmith	26	File cutter	5
Consul	1	Fruit cutter	4
Card writer	6	Fitter	4
Canmaker	22	Flour packer	2
Clergyman	79	Fish dealer	29
Carpet layer	35	Fur dealer	23
Candymaker	17	Fresco painter	11
Car driver	154	Furniture painter	9
Conductor	193	Grocer	820
Compositor	119	Gripman	87
Custom cutter	2	Grinder	4
Cutler	16	Glazier	35
Car builder	21	Glove cutter	24
Carriagemaker	115	Gilder	28
Carver	6	Gardener	197
Custom house	39	Glassmaker	5
Coffee roaster	7	Guard	14
Chair repairer	2	Goldbeater	7
Carpet dealer	4	Gasfitter	124
Carder	9	Galvanizer	6
Cork cutter	1	Glassblower	23
Chiropodist	3	Grain dealer	23
Costumer	4	Glass engraver	4
Cane worker	4	Gauger	12
Cutter	44	Gunsmith	15
Carpet beater	5	Glass stainer	5
Carriage painter	16	Gloymaker	15
Cloakmaker	7	Grainer	30

TABLE Z—Continued.

Glove finisher.....	3	Melter.....	13
Gentleman.....	2	Mattressmaker.....	20
Glue manufacturing.....	1	Mill hand.....	76
Hay dealer.....	17	Marble cutter.....	70
Hair dresser.....	16	Mechanic.....	58
Hostler.....	224	Mason.....	39
Hotel runner.....	4	Marble dealer.....	5
Hackman.....	110	Mineralogist.....	2
Harnessmaker.....	113	Milliner.....	2
Horse dealer.....	19	Metallurgist.....	5
Hotel keeper.....	185	Marble polish.....	9
Hardware.....	21	No occupation.....	556
House mover.....	36	News agent.....	24
Hatter.....	54	Newspaper.....	9
Horse trainer.....	12	Notary.....	23
Horse clipper.....	7	Nurse.....	22
Insurance.....	230	Naturalist.....	3
Inventor.....	8	Nailer.....	2
Ironworker.....	81	Netmaker.....	1
Interpreter.....	15	Optician.....	19
Ironmolder.....	55	Oysterman.....	43
Instrumentmaker.....	6	Oil finisher.....	1
Inspector.....	59	Oiler.....	19
Iceman.....	6	Operator.....	3
Ivory turner.....	1	Painter.....	1,017
Inkmaker.....	2	Propertyman.....	11
Jeweler.....	186	Plumber.....	407
Janitor.....	130	Plasterer.....	208
Jockey.....	1	Porter.....	654
Journalist.....	154	Policeman.....	475
Junk dealer.....	19	Patternmaker.....	80
Japanner.....	6	Photographer.....	74
Joiner.....	13	Printer.....	675
Jobber.....	13	Pork packer.....	20
Kalsominer.....	1	Piano tuner.....	10
Knitter.....	1	Pilot.....	26
Laborer.....	3,902	Peddler.....	133
Law clerk.....	18	Pressman.....	58
Liquor dealer.....	255	Packer.....	94
Locksmith.....	36	Physician.....	373
Land expert.....	2	Polisher.....	46
Laundry.....	198	Professor.....	3
Librarian.....	14	Patrolman.....	7
Lodging-house.....	73	Paver.....	20
Lumberman.....	99	Paper dealer.....	2
Lawyer.....	619	Paper hanger.....	42
Livery stable.....	50	Politician.....	13
Longshore.....	206	Paper carrier.....	57
Letter carrier.....	130	Pharmacist.....	6
Lastmaker.....	10	Pipefitter.....	1
Lighthouse.....	5	Produce.....	76
Lamplighter.....	34	Pantryman.....	4
Lather.....	44	Publisher.....	42
Lithographer.....	32	Paper ruler.....	12
Logger.....	1	Purser.....	11
Lumper.....	2	Presser.....	5
Lapidary.....	2	Planer.....	3
Lecturer.....	3	Pianomaker.....	26
Leather dealer.....	7	Pipemaker.....	4
Merchant.....	2,109	Parasolmaker.....	6
Morocco dresser.....	7	Papermaker.....	2
Miner.....	427	Perfumer.....	4
Manager.....	63	Phrenologist.....	1
Miller.....	74	Provision dealer.....	1
Manufacturer.....	277	Penmaker.....	1
Molder.....	260	Rubber stamps.....	1
Millwright.....	53	Restaurant.....	135
Messenger.....	30	Rancher.....	13
Millstones.....	1	Real estate.....	400
Machinist.....	755	Roofer.....	51
Master mariner.....	92	Reporter.....	71
Musician.....	189	Rigger.....	43
Metal roofer.....	22	Railroad.....	100

TABLE Z—Continued.

Raftsmen.....	2	Sparmaker.....	3
Ropemaker.....	15	Suspendermaker.....	4
Renovator.....	1	Sawmaker.....	3
Rubbermaker.....	3	Springmaker.....	2
Rope splicer.....	6	Type caster.....	9
Stock driver.....	4	Tallow dealer.....	2
Ship joiner.....	30	Teamster.....	1,625
Shoe crimper.....	5	Telegrapher.....	62
Sailmaker.....	62	Tinsmith.....	248
Silversmith.....	16	Tobacconist.....	23
Speculator.....	109	Treasurer.....	8
Stevedore.....	247	Teacher.....	169
Steward.....	110	Tailor.....	469
Superintendent.....	120	Tanner.....	200
Surveyor.....	60	Ticket agent.....	2
Showman.....	10	Trainer.....	2
Shipwright.....	133	Trunkmaker.....	46
Saloon keeper.....	946	Turner.....	15
Salesman.....	977	Type foundry.....	10
Seaman.....	661	Taxidermist.....	2
Student.....	104	Tentmaker.....	4
Stair builder.....	25	Type finisher.....	5
Sawmaker.....	5	Type writer.....	2
Spinner.....	13	Trussmaker.....	2
Shoemaker.....	815	Timekeeper.....	3
Storekeeper.....	67	Undertaker.....	46
Stove mounter.....	13	Upholsterer.....	206
Solicitor.....	86	Umbrellamaker.....	4
Stonecutter.....	97	Usher.....	4
Strimmer.....	1	United States Marshal.....	1
Secretary.....	117	United States navy officer.....	1
Switchman.....	3	Valisemaker.....	1
Sawyer.....	64	Vegetable dealer.....	2
Steamboat.....	35	Varnisher.....	64
Stable keeper.....	120	Ventriloquist.....	2
Sill setter.....	1	Violinmaker.....	1
Shirtmaker.....	21	Viticulturist.....	1
Seedsman.....	2	Vinegarmaker.....	1
Shoe fitter.....	30	Vocalist.....	4
Saddler.....	37	Waiter.....	420
Stationer.....	44	Wagonmaker.....	33
Safe builder.....	3	Watchman.....	232
Stockman.....	31	Weaver.....	20
Shoefinisher.....	5	Wheelwright.....	20
Stock broker.....	28	Wood carver.....	38
Sashmaker.....	12	Weigher.....	62
Shuttermaker.....	1	Wharf builder.....	12
Stone mason.....	11	Wool sorter.....	57
Soldier.....	69	Whitener.....	34
Stenographer.....	47	Wood turner.....	26
Ship liner.....	3	Wood dealer.....	7
Searcher of records.....	21	Wood polisher.....	1
Steamfitter.....	9	Watchmaker.....	38
Spice man.....	4	Wine dresser.....	6
Scavenger.....	16	Wire worker.....	31
Shoe cutter.....	61	Well borer.....	1
Ship chandler.....	7	Watch-case maker.....	1
Soapmaker.....	32	Wire drawer.....	5
Stereotyper.....	13	Wigmaker.....	1
Saw filer.....	7	Wharfinger.....	7
Sculptor.....	3	Whipmaker.....	7
Shoe dealer.....	24	Yeastmaker.....	1
Salt dealer.....	1		
Soda water.....	10		
Stonemaker.....	2		
		Grand total.....	48,523

TABLE A A.

Showing Nativity of Voters Registered in San Francisco in 1886.

<i>Native Born.</i>			
Alabama	62	Canada	506
Arkansas	20	Cuba	5
Alaska	3	Chile	27
California	7,857	Cape of Good Hope	2
Connecticut	430	China	1
Colorado	8	Central America	2
Delaware	62	Denmark	320
District of Columbia	85	England	1,777
Florida	15	East Indies	8
Georgia	64	Ecuador	1
Indiana	271	France	644
Iowa	155	Finland	21
Illinois	504	Germany	6,296
Idaho	4	Greece	20
Indian Territory	2	Gibraltar	1
Kansas	21	Great Britain	2
Kentucky	249	Guatemala	1
Louisiana	317	Holland	81
Maine	1,210	Honduras	2
Massachusetts	2,695	Hungary	34
Mississippi	54	Ireland	9,608
Missouri	399	India	3
Michigan	265	Italy	582
Minnesota	51	Isle of Man	13
Maryland	439	Isle of Jersey	2
New York	4,970	Isle of Guernsey	3
New Jersey	445	Island of Madeira	1
New Hampshire	386	Island of St. Helena	1
North Carolina	61	Island of St. Thomas	1
Nevada	89	Island of Jamaica	16
Nebraska	16	Japan	3
New Mexico	6	Mexico	34
Ohio	927	Malta	5
Oregon	99	New Brunswick	152
Pennsylvania	1,379	New Zealand	12
Rhode Island	252	Newfoundland	18
South Carolina	104	Nova Scotia	198
Tennessee	107	Norway	194
Texas	42	Portugal	88
Utah	21	Poland	190
United States	2	Peru	4
Vermont	374	Prince Edward Island	55
Virginia	410	Philippine Islands	3
Wisconsin	284	Russia	190
Washington Territory	24	Roumania	2
Wyoming Territory	1	Spain	19
		South America	6
Total	25,241	Scotland	569
		Sweden	398
		Switzerland	279
		Society Islands	1
		Sandwich Islands	9
		Turkey	2
		United States of Colombia	4
		Venezuela	3
		Wales	101
		West Indies	35
		Total	23,273
<i>Foreign Born.</i>			
Austria	368		
Australia	212		
Africa	4		
Azores	10		
At sea	30		
Belgium	45		
Brazil	6		
British America	3		
British Columbia	17		
Bohemia	23		

Total native born citizens	25,241
Total foreign born citizens	23,273
Grand total	48,514
Excess of native born, 1,964, or 8 per cent.	

TABLE B B.

Number of Native and Foreign Born Artisans Registered Voters in San Francisco, 1886.

OCCUPATION.	Native	Foreign	Total	OCCUPATION.	Native	Foreign	Total
Architect	33	20	53	Lather	29	15	44
Assayer	29	10	39	Lithographer	24	8	32
Bricklayer	90	96	186	Locksmith	13	23	36
Brass finisher	42	24	66	Machinist	404	351	755
Boatbuilder	19	6	25	Marble cutter	30	40	70
Brushmaker	19	8	27	Mason	13	26	39
Blacksmith	311	322	633	Mattressmaker	13	7	20
Boilermaker	142	144	286	Millwright	36	17	53
Carpenter	978	849	1,827	Molder	139	121	260
Cabinetmaker	55	113	168	Musician	93	96	189
Carriagemaker	63	52	115	Optician	10	9	19
Carriage painter	11	5	16	Painter	647	370	1,017
Carriage trimmer	26	4	30	Patternmaker	56	24	80
Calker	76	65	141	Photographer	54	20	74
Cigarmaker	81	113	194	Pianomaker	11	15	26
Civil engineer	28	7	35	Plasterer	76	132	208
Compositor	101	18	119	Plumber	266	141	407
Cooper	96	129	225	Pressman	44	14	58
Currier	17	18	35	Printer	538	137	675
Cutler	9	7	16	Rigger	11	32	43
Coppersmith	14	12	26	Roofer	47	21	68
Decorator	8	3	11	Ropemaker	5	10	15
Draughtsman	35	16	51	Saddler	20	17	37
Electrician	18	11	29	Safemaker	1	2	3
Electroplater	10	7	17	Sailmaker	28	34	62
Electrotyper	5	3	8	Sashmaker	5	7	12
Engraver	22	19	41	Sculptor	3	.....	3
Finisher	44	20	64	Ship joiner	23	7	30
Foundryman	28	10	38	Shipwright	54	79	133
Framemaker	24	10	34	Shoemaker	305	587	892
Fresco painter	3	8	11	Silversmith	5	11	16
Furrier	8	15	23	Stairbuilder	11	14	25
Gasfitter	84	40	124	Stereotyper	6	7	13
Gardener	34	163	197	Stonecutter	35	62	97
Gilder	15	13	28	Surveyor	42	18	60
Glass blower	18	5	23	Tanner	65	135	200
Glass maker	2	3	5	Tailor	77	392	469
Glass engraver	3	1	4	Tinsmith	161	87	248
Glass stainer	4	1	5	Trunkmaker	34	12	46
Glazier	8	27	35	Umbrellamaker .....	.....	4	4
Glove cutter	17	7	24	Upholsterer	128	78	206
Glovemaker	10	5	15	Varnisher	35	29	64
Gunsmith	9	6	15	Wagonmaker	18	15	33
Hatter	33	21	54	Watchmaker	20	18	38
Harnessmaker	60	53	113	Weaver	9	11	20
Instrumentmaker	4	2	6	Wharfbuilder	7	5	12
Ironmolder	39	16	55	Wheelwright	9	11	20
Ironworker	30	51	81	Wire worker	17	14	31
Japanner	5	1	6	Wood carver	20	18	38
Jeweler	109	77	186	Wood turner	12	14	26
Joiner	8	5	13				
Lastmaker	8	2	10	Totals	6,644	5,960	12,604

Total of native born artisans 6,644

Total of foreign born artisans 5,960

Excess of native born 684, or 11 per cent.

Among the registered voters of San Francisco it can be seen that while the number of native born exceeds the foreign by only 8 per cent, the number of native mechanics exceeds the foreign by 11 per cent. The trades in which the foreign element largely predominates are tailors, shoe-

makers, tanners, gardeners, cigarmakers, cabinetmakers, locksmiths, masons, riggers, glaziers, stonecutters, coopers, and plasterers. Those in which the native predominates are printers and compositors, plumbers and gas fitters, painters, millwrights, patternmakers, photographers, roofers, shipjoiners, surveyors, boat builders, tinsmiths, trunkmakers, carriage painters and trimmers, and glovecutters. Blacksmiths, boilermakers, carpenters, and bricklayers run very close together in the number of native and foreign born citizens.

RULES OF TRADES UNIONS CONCERNING APPRENTICES.

It is the fashion to rail at trades unions because many of them limit the number of apprentices. In some instances this is no doubt well deserved, but in the majority of trades it is simply a step in the direction of elevating the standard of the craft. They must in some way protect themselves against workshops being filled with boys who learn little, and are only used for the convenience and profit of selfish employers. Every mechanic knows he has not much to fear from those skilled in his own trade. But he does fear the botches, the boys who worked at the trade but did not learn it. In the absence of apprentice laws, workingmen are compelled to throw around their trade certain restrictions to protect it from utter demoralization.

The present state of affairs has a tendency to reduce wages by filling our industries with incompetent workmen. A limitation upon the number of apprentices has always existed by custom of the craft. The number that should be taken must be affected, to a large extent, by the general principles of the demand and supply of labor. In France, in the seventeenth century, masters were limited to one apprentice. In England, at the beginning of the eighteenth century, apprentices became so numerous that when they became workmen they were so unskilled that some crafts were utterly ruined. Laws were passed, from time to time, limiting the number of apprentices in the trades and crafts, some to two apprentices, some to the sons of master workmen and employers, and some to the sons of persons who had three pounds sterling annual rental. It is the law of self-preservation to the craft that there should be some limitation to the number of apprentices. If the number is unlimited, unscrupulous contractors secure a large number of apprentices, and, with the help of a few journeymen, underbid all who employ only the skilled in their craft. This necessarily throws upon the trade large additions of unskilled workmen, thereby making the supply of labor in excess of the demand, besides impairing the standard of the craft for good work. With mechanics it is not a question as to whether everybody shall have the right to learn a trade, but whether the craft will teach every boy who applies a trade to its own injury. They have to protect themselves from being flooded by incompetent journeymen and by boy and girl labor. By reference to my report of an investigation into the condition of printers, it will be seen that some printing houses were run chiefly by boy and girl labor, and the number of apprentices was outrageously disproportionate to the number of journeymen employed. The number of trades in which the class called "helpers" are employed is increasing every year. These "helpers" have learned a slight knowledge of the business, and, earning only apprentices' wages, are glad of the opportunity to work on their own account at reduced journeymen wages. Employers take advantage of this floating, non-descript class of labor, and advertise extensively for young men and boys with some knowledge of, or who have had one or two years' experience in, the business. A few samples of the many advertisements of this charac-

ter, which daily appear, have been taken from the San Francisco papers, and are here submitted :

ADVERTISEMENTS FOR "HELP" WITH EXPERIENCE.

WANTED--BOY OF 16 TO 18, WHO HAS HAD ONE OR TWO YEARS' EXPERIENCE IN PRINTING BUSINESS; good wages and steady place to the right one.

WANTED--YOUNG MAN WITH SOME KNOWLEDGE OF TYPE.

BOY TO SET TYPE; WAGES \$4 A WEEK.

AMERICAN BOY, WITH EXPERIENCE IN PRINTING OFFICE; STATE AGE and give reference.

DRUG CLERK WANTED--JUNIOR, WITH TWO YEARS' EXPERIENCE, FOR laboratory work in Market Street store.

BOY WANTED--MUST HAVE SOME EXPERIENCE IN DRUG BUSINESS.

BOY WANTED--FROM 15 TO 18; ONE FAMILIAR WITH DRUG OR SPICE business.

WANTED--BOY TO LEARN THE DRUG BUSINESS; ONE WITH SOME EXPERIENCE preferred.

BOYS WANTED--BOYS FROM 16 TO 18; THOSE FAMILIAR WITH SPICE OR extract business preferred.

BOY WANTED WHO UNDERSTANDS FEEDING GORDON PRESS.

PLUMBERS' HELPERS; WAGES \$6 TO \$9 PER WEEK.

TINSMITH; ALSO BOY WITH SOME EXPERIENCE.

GOOD TINSMITH AND PLUMBER'S HELPER WANTED.

WANTED--YOUNG BARBER WITH EXPERIENCE.

BOY WITH SOME EXPERIENCE AT BARBER TRADE.

WANTED--A BOY WHO UNDERSTANDS A LITTLE ABOUT HOUSE PAINTING and stage work.

WANTED--YOUNG MAN IN PAPER BOX FACTORY; WITH EXPERIENCE preferred.

WANTED--A YOUNG MAN WHO HAS HAD SOME EXPERIENCE IN THE piano business.

WANTED--A YOUNG MAN ABOUT 18 YEARS OLD, WITH SOME EXPERIENCE in French kid cutting.

WANTED--A YOUNG MAN HAVING SOME KNOWLEDGE OF WATCH making; good chance to finish.

EXPERIENCED BOY WANTED AT CANDY FACTORY; STEADY JOB.

WANTED--YOUNG MAN WITH SOME EXPERIENCE IN MOLDING, FOR A zinc foundry.

In reading over these advertisements one would be likely to imagine that it was the dread that the American boy would never be afforded the opportunity of becoming a mechanic which induced these philanthropic individuals to give him the chance to become one.

The employer who advertises for a "boy of sixteen to eighteen who has had one or two years' experience in the printing business," wants him not for the purpose of giving him a chance to complete his knowledge of the craft, but to take a man's place at the case or press. In another of the foregoing advertisements a young man having "some" knowledge of watch-

making is offered a "good chance to finish." This appears most kind and disinterested on its face, but when the young man looked for applies, he will find he is wanted to do a journeyman's work at boy's wages, and the "good chance to finish" will come in the "sweet bye and bye."

In one advertisement a boy is wanted who understands feeding a Gordon press, and in another, a "boy" who understands a little about house painting and stage work. *Men* would not do for they would want men's wages. *Boys* are in demand who could take the places of men at half or one third of men's wages. It is advertisements such as these which seduce boys from the shop where they are learning a trade only to become nondescript laborers or nomad mechanics. For the sake of a dollar or two extra per week they will leave the employer under whom they were acquiring a thorough knowledge of the trade, and thus throw away the only chance they will probably ever have of becoming skilled mechanics. There are some parts of nearly every mechanical trade which almost anybody after some practice can do, and a class of shiftless fellows without the grit or energy to learn a trade thoroughly, because they know these parts, imagine they are mechanics. They have learned to saw and plane a board, to drive a nail, and to mortise a joint, and they are at once carpenters. They have learned to spread the mortar and to lay the brick straight and build a wall plumb three or four feet high, and think themselves brickmasons. Such fellows, when they assume the position of mechanic, spoil much work, live and die a botch, join the "scab" ranks, and bring discredit not only upon themselves but upon the craft to which they claim to belong.

LIMITING OF APPRENTICES BY TRADES UNIONS.

While the effort to shut this class out from the privileges of the trades unions is just and proper, the arbitrary and ill-liberal rules of some trades regarding the admission of apprentices cannot but react injuriously upon themselves. If American youths are debarred from the opportunity of learning certain trades by the narrow-minded, selfish course of the members, foreign workmen will be brought in to supply the ever increasing demand.

Not long ago a large firm in San Francisco, engaged in iron work, was forced to engage foreign workmen in order to fill their contracts. "This would not be necessary," said one member of the firm, "if the boys here had been allowed the chance to learn the business."

The action of some trades unions towards the close limitation of apprenticeship is of the same character as the combinations and trusts which are now spreading over the country. They, also, limit the supply, stop the production, and corner the market, in order to enhance the value of the commodities on hand. The schemes by which the prices of certain manufactures, and of sugar, lumber, coal, etc., are kept up, to the injury of the consumer and the benefit of the wealthy speculator, rest on the same foundation as those by which certain crafts corner the supply of labor. Of course, one class has as much right to do these things as another, upon the principle that all is fair in business as in war.

Unfortunately, the evils of limiting the number of apprentices extend beyond the inconvenience of the masters of establishments or the suffering induced by the increase of the prices of productions, for the question arises, What shall become of the boys who formerly served apprenticeship under master mechanics? How is to be brought about and maintained the balance in the community between skilled and unskilled labor—between those who add to the value of material by industry and art, and those who, though employed, add nothing to the general stock, and, too

often, finding their small abilities unavailable in an honest calling, contrive to use them to the injury of others and the ruin of themselves? This cornering of the labor supply is one of the efficient causes of idle boys on our streets, from sixteen to twenty years of age, who drift around aimlessly until driven to enter upon pursuits which lead to board, lodging, and confinement at the public expense.

In the following circular, addressed to the proprietors and foremen of foundries, the journeymen ironmolders of San Francisco have set forth so lucidly the reasons of the union for setting a limit to the number of apprentices, that their arguments apply equally as well to all other organizations that set a similar limit:

CIRCULAR ADDRESSED TO THE FOUNDRYMEN OF SAN FRANCISCO.

To the Proprietors and Foremen of — — — :

GENTLEMEN: The increase of apprentices has been so great during the past three years, that at the present time considerable uneasiness is felt by the journeymen ironmolders of this city, who see no brighter prospects ahead than hard labor through life for such wages as conditions compel employers to give. The manner in which these apprentices are being used in many shops has a tendency to keep down the price of labor, and in dull times they are always retained, while journeymen molders, with families to support, are compelled to walk the streets in idleness, or, if employed, forced to work for such wages as bring degradation and poverty to themselves and families. In view of these facts, the Iron Union of North America, as a means of self-preservation, has wisely made a pro rata limit of one apprentice to every eight journeymen molders employed in any shop. For years we have seen this mischief afoot, and permitted it to take what course it might, until now we are compelled to act in the matter or suffer the disastrous results that are sure to follow a continuation of this evil. From carefully gathered facts we find that in your foundry there are at the core bench and on the floors — apprentices and — journeymen employed, making one apprentice to every — journeymen. Knowing how inconvenient and unpleasant it would be for your firm to make the change immediately, and adopt the pro rata limit established by our society, and owing to the fact that we desire, if possible, to live at peace and on good terms with our employers, we have decided not to demand the immediate dismissal of any apprentices from your foundry, but hope and expect that no more will be employed until time has made the desired change. We feel in duty bound by our obligation to resist any further increase of apprentices by your firm. This injunction being complied with, the Ironmolders Union will do its utmost to make good mechanics of those now employed, and also assist you to obtain the full benefit of their apprenticeship, with a sincere desire that in the future * * *

By order of the Ironmolders Union, No. —, of —.

IRONMOLDERS RULES ABOUT APPRENTICES.

The Ironmolders Union of North America has undoubtedly made the strongest and most persistent efforts to control the subject of apprentices in the trade of ironmolding. This is no doubt due to the fact that the organization was originally formed on account of the number of so called apprentices at the trade, not taught by employers, but journeymen forced to employ and teach them; the average in some sections being two apprentices to each journeyman. The organization at its inception (1859) was able to destroy that system, and in its place secured the present apprentice system, the employer hiring the apprentice, and the journeyman using his discretion as to teaching the apprentice. The law of the union on this subject is as follows:

SECTION 1. It shall be the duty of the several local unions, and each and every member, to use every honorable means to have each and every apprentice to the trade of iron molding legally indentured, and to have such apprentice serve at least four years, and it shall be the duty of each member to assist every indentured apprentice in securing a full knowledge of the trade. And to this end they shall discourage the employment of apprentices by the piece, or the steady employment on any one pattern, job, or piece.

SEC. 2. Any apprentice so indentured and leaving his employer without such indenture being canceled, shall not be permitted to work under the jurisdiction of any union, if in the power of the union to prevent it. And the employer of such apprentice shall receive all reasonable assistance to secure his return. Any apprentice so indentured shall not be permitted to become a member of this union, except upon presentation of his indentures for examination, or a certificate from his employer.

SEC. 3. It shall be the duty of each union, when an employer refuses to have his apprentices indentured or to serve four years, to do all in his power to restrict the employment of such apprentices to the following ratio: One apprentice to the shop, and one for every eight molders employed.

SHUTTING OUT THE AMERICAN BOY.

There is one feature of this limitation of apprentices which appears most objectionable. It is giving an alien a voice or a vote in a trades union in excluding an American boy from the privilege of learning a trade. Suppose the case of a foreign born mechanic who has not been a year in the United States, and who cannot speak our language, who has not declared his intentions of becoming a citizen of the United States, but has become a member of a trades union. Is it right that he should have the power to decide by his vote whether an American boy should be admitted as an apprentice or not?

If excluded by the rules of any union from the opportunity of learning a trade for which his tastes incline, some other channel should be open to him to learn the same. It should not only be the privilege, but the right of every American boy who is otherwise qualified, to have the means afforded him to learn any trade for which he has a taste. Of course the above is only a suppositious case, but it is one which is possible to occur in organizations whose rules do not exclude non-citizens from the right to vote.

The following table shows that out of forty-eight trade organizations only fourteen, or less than one third, have rules or regulations relating to apprentices or limiting their number. The bricklayers is the first of these on the list. They limit the number to two apprentices to each master mason or employer, no matter how many mechanics he may have in his employ, and they must be the sons of bricklayers. Another rule they have is that "the right of any person to take an apprentice, except a master mason, will not be recognized by this association." Under this rule, it would appear that a journeyman bricklayer is not allowed to teach his trade to his own son, unless he could be one of the two allowed to the master mason who employs him. The calker's rule is still more stringent, as they allow only one to each employer. The cigarmakers limit the number to one to each shop, and one to ten men; the glassblowers, one to fifteen men; the patternmakers, one to four; the ironmolders, one to each shop and one to eight men; the coopers, one son to each member; the tailors, one to each member, regardless of relationship; the hatters allow two in every shop, and the stonecutters the same number in every yard; the woodcarvers, one to a shop, and two, if six or more men are employed.

TABLE C C.
Showing Trades Unions Apprentices Regulations.

NAME OF ORGANIZATION.	Number of Apprentices Allowed by Union.	Term of Apprenticeship.	WEEKLY WAGES.			
			First Year.	Second Year.	Third Year.	Fourth Year.
Bakers National Union, Journeymen	No regulation or limit.	Three years to learn				
Bakers, Cake and Confectionery (German)	No regulation or limit.	Three to five years to learn.				
Brewery Employés Union of Pacific Coast.	No regulation or limit.					
Brick Handlers Protective Union.	No regulation or limit.					
Boot and Shoemakers White Labor League	No regulation or limit.					
Bookbinders Union.	No regulation or limit.					
Butchers, Journeymen of Pacific Coast.	No regulation or limit.					
Bricklayers Association of San Francisco	Two to each employer.	Four years.	\$4 00	\$10 00	\$15 00	\$18 00
Bag and Satchel Makers	One to every six men in a shop	Three years.	2 50	4 00	8 00	
Boilermakers and Iron Ship Builders.	No regulation or limit.	Four years.	3 00	9 00	12 00	15 00
Brewers and Malsters of Pacific Coast.	No regulation or limit.	Three to five years to learn.				
Barbers Protective.	No regulation or limit.	Four years to learn				
Calkers Association of San Francisco	One to each "boss."	Three years				
Cane and Willow Workers	No regulation or limit.	One year.				
Cigarmakers, International.	One to each shop; then one to ten men; in no shop more than three.					
Coopers, Journeymen (English).	One son of each member	Three years.	3 00	4 00	5 00	6 00
Coopers of Pacific Coast (German).		Four years to learn	5 00	6 00	8 00	10 00
Coremakers Union, No. 1, of San Francisco.	No regulation or limit.	Three years	4 00	8 00	12 00	
Candy-makers Protective Union.	No regulation or limit.	Three years to learn	5 00	7 00	9 00	
Dry Goods Men's Association.	No regulation or limit.	Must have three years' experience				
Engineers, Stationary, of Pacific Coast.	No regulation or limit.	Must have two years' sea experience.				
Engineers, Marine.	No regulation or limit.	According to proficiency.	3 50	6 00	8 00	
Furniture Workers, International	No regulation or limit.	Three years				
Gloves Union.	No regulation or limit.	Four years.	2 50	3 00	4 00	5 00
Glass Blowers	One to every fifteen journeymen	Four years.				
Harnessmakers	Two in every shop	Four years.				
Hatters Association	No regulation or limit.	Four years.				
Horseshoers Association.	One to a shop; then one to eight members.	Five years.				
Ironmolders	No regulation or limit.	Four years.				
Jewelers Protective Union	No regulation or limit.	Five years.				
Lasters Association.	No regulation or limit.	Four years.				

TABLE C C—Continued.

NAME OF ORGANIZATION.	Number of Apprentices Allowed by Union.	Term of Apprenticeship.	WEEKLY WAGES.			
			First Year.	Second Year.	Third Year.	Fourth Year.
Musicians Mutual Protective	No regulation or limit	Must pass examination				
Machinist	No regulation or limit	Four years				
Pressmen's Union of San Francisco	No regulation or limit					
Painters, Fresno	No regulation or limit					
Painters, Journeymen	No regulation or limit	Three years				
Patternmakers	One to every four journeymen	Three to four years	\$4 00	\$6 00	\$8 00	\$10 00
Pavers Union	No regulation or limit					
Packers, Cigar, International Union	No regulation or limit	Three years				
Shipwrights Association	One to every three packers	Three years	3 00	6 00	8 00	
Ship and Steamboat Joiners	No regulation or limit	Four years				
Stonecutters	No regulation or limit	Four years				
Typographical Union*	Two in each yard	Four years				
Tailors Protective	One to each member					
Wood Carvers	One to a shop, and two, if six or more men are employed	Four years				
Wharf Builders	No regulation or limit					
Upholsterers, Carpet	No regulation or limit	Two years	5 00			

* Evening papers, one to ten journeymen; weekly, one to five; morning papers, one to fifteen journeymen; job houses, one to four. No apprentices allowed to work by piece.

WAGES OF APPRENTICES.

As can be seen by the table very few unions have any regulations about wages. This is owing to the want of an apprentice law, for if a boy does not like the wages he leaves his employer, who has not the power to prevent him. It is the custom then to leave the question of wages in the hands of the employer. In some trades boys must serve the first three months gratis, after which they are generally paid \$3 a week for the remainder of the year, and advanced \$1 each year. In others they get \$3 a week for the first six months, and are then advanced \$1 per week, and so on every recurring six months. The first consideration for our boys is not the question of how much they are going to be taught in any trade, but how much wages they are going to be paid. In olden times a boy had to pay a fee for being taught instead of being paid while learning, but now the learning part is sunk and the question of pay is uppermost. The result is the boy gets his pay for what he is worth and learns little or nothing. This is a most mischievous and short-sighted policy on the part of those who look to the amount of wages as the main inducement of entering certain establishments, instead of the facilities afforded for becoming thorough mechanics.

Parents are often guilty of almost criminal folly in apprenticing their children in places where they can earn \$3 or \$4 per week, but where no pains will be taken to give them a knowledge of the business.

LABOR IMMIGRATION FROM EUROPE.

The following tables show the number of immigrants from Europe received into the United States from 1873 to 1886, inclusive, classified according to occupations, etc.

Considerably more than half a million, or five hundred and eighty-seven thousand three hundred and forty-nine, skilled laborers arrived in the United States during that period of fourteen years, or at the rate of about forty-two thousand per year. Of this number we received from Germany, one hundred and seventy-nine thousand eight hundred and eighty-five, or 30 per cent; and from Great Britain and Ireland, one hundred and eighty-two thousand five hundred and eleven, or 31 per cent. The total immigration during the same period was more than five millions, so that the proportion of skilled labor was about 10 per cent of the whole.

By referring to the table of the division of the sexes, it will be observed that twenty-eight thousand one hundred and thirty-four, or less than 5 per cent of those classed in the "skilled" occupations, are women, or in the proportion of one woman to nineteen men. Of the number classed "without occupation," one million eight hundred and one thousand nine hundred and eighty-five, or about 70 per cent, are females.

TABLE Y. No. 2.

Total Immigration from Europe from 1873 to 1886, inclusive, Classified by Occupation.

YEAR.	Pro- fessional.	Skilled.	Miscellane- ous.	Occupation not Stated.	Without Occupation.	Total.
1873	2,980	48,792	168,724	4,868	234,439	459,803
1874	2,477	38,700	117,041	4,233	150,889	313,339
1875	2,426	33,803	84,546	1,291	105,432	227,498
1876	2,400	24,200	72,275	910	70,201	169,986
1877	1,885	21,003	55,650	673	62,643	141,857
1878	1,510	16,531	57,806	738	61,884	138,469
1879	1,639	21,362	73,053	897	80,875	177,826
1880	1,773	49,929	188,109	2,194	215,252	457,257
1881	2,812	66,457	244,492	8,140	347,530	669,431
1882	2,992	72,664	310,501	10,619	392,210	788,992
1883	2,450	62,505	216,549	46,600	275,658	603,322
1884	2,284	55,061	184,195	31,665	245,387	518,592
1885	2,097	39,817	141,702	15,398	196,332	395,346
1886	2,078	36,522	137,651	496	157,456	334,203
Totals	31,803	587,349	2,052,294	128,782	2,596,188	5,396,416

TABLE D D.

Total Immigration from Europe from 1873 to 1886, inclusive, Classified by Sexes.

YEARS.	OCCUPATIONS.					
	Profes- sional.	Skilled.	Miscellane- ous.	Not Stated.	Without.	Total.
<i>Males.</i>						
1873	2,741	47,490	152,581	1,371	71,609	275,792
1874	2,137	37,301	104,511	1,054	44,222	189,225
1875	2,147	32,014	73,732	255	31,802	139,950
1876	2,182	23,015	65,579	341	20,669	111,786
1877	1,674	20,144	50,116	287	19,812	92,033
1878	1,375	15,806	51,409	138	17,531	86,259
1879	1,515	20,728	65,801	294	23,544	111,882
1880	1,704	48,787	178,784	1,206	57,142	287,623
1881	2,563	64,744	225,524	7,262	110,636	410,729
1882	2,865	68,745	288,221	9,689	129,294	498,814
1883	2,265	56,840	188,375	26,174	90,209	363,863
1884	2,184	50,905	160,159	19,778	75,483	308,509
1885	1,930	37,407	121,564	8,950	56,531	226,382
1886	1,943	35,289	117,546	201	45,725	200,704
<i>Females.</i>						
1873	239	1,302	16,143	3,497	162,830	184,011
1874	339	1,399	12,530	3,179	106,667	124,114
1875	279	1,789	10,814	1,036	73,630	87,548
1876	218	1,185	6,696	569	49,532	58,200
1877	211	862	5,534	386	42,831	49,824
1878	135	725	6,397	600	44,353	52,210
1879	124	634	7,252	603	57,331	65,944
1880	69	1,142	9,325	988	158,110	169,634
1881	249	1,713	18,968	878	236,894	258,702
1882	127	3,919	22,280	930	262,922	290,178
1883	185	5,665	27,674	20,486	185,449	239,459
1884	100	4,156	24,036	11,887	169,904	210,083
1885	167	2,410	20,138	6,448	139,801	168,964
1886	135	1,233	20,105	295	111,731	133,499

Total Both Sexes.

1873	459,803	1878	138,469	1883	603,322
1874	313,339	1879	177,826	1884	518,592
1875	227,498	1880	457,257	1885	395,346
1876	169,986	1881	669,431	1886	334,203
1877	141,857	1882	788,992		

TABLE E E.
Immigration from Europe, by Occupation, from 1873 to 1886, inclusive.

OCCUPATION.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.	1886.
Actors	39	93	111	88	148	51	41	22	116	55	180	38	94	73
Artists	111	157	105	146	92	81	144	189	340	217	143	112	126	165
Clergymen	334	445	366	417	373	319	320	269	387	418	369	231	259	269
Editors	16	21	9	42	66	13	21	32	81	61	23	21	25	32
Engravers	133	54	89	106	97	26	61	28	140	82	60	75	57	49
Lawyers	114	97	126	76	66	37	39	46	70	102	83	47	53	92
Musicians	569	572	500	421	320	396	341	369	430	543	331	535	377	367
Physicians	182	139	167	177	119	91	125	183	142	264	118	160	176	165
Sculptors	21	22	28	29	43	43	59	43	96	132	119	133	96	84
Teachers	370	482	378	301	185	199	203	211	348	479	454	445	408	353
All others (not stated)	1,101	374	527	597	376	278	301	335	662	639	618	437	426	429
Total professional	2,980	2,476	2,426	2,400	1,885	1,510	1,639	1,773	2,812	2,992	2,450	2,284	2,007	2,578
Accountants, etc.	46	50	154	89	109	97	105	184	256	182	156	162	113	129
Bakers	1,398	1,030	730	640	507	464	636	1,377	2,264	2,453	2,331	1,971	1,465	1,209
Barbers and hairdressers	228	192	240	156	142	113	141	248	409	478	554	495	371	355
Blacksmiths	1,894	1,461	1,267	816	787	673	911	2,311	3,986	4,099	2,801	2,508	1,819	1,420
Brewers	544	743	374	284	241	350	236	617	956	955	885	984	609	382
Butchers	1,346	979	582	521	489	645	710	1,138	1,968	2,269	2,102	2,059	1,391	1,190
Cabinetmakers	122	99	145	114	109	173	358	1,574	1,882	731	118	109	92	114
Carpenters and joiners	6,406	4,354	3,383	2,631	1,730	1,876	2,739	8,231	11,181	11,900	8,662	7,216	4,392	3,678
Clerks	2,324	1,547	1,414	1,385	1,253	1,340	1,724	2,800	3,189	3,412	3,387	3,518	3,413	3,027
Coopers	601	356	431	325	265	287	147	453	544	478	540	353	188	158
Dressmakers	230	241	216	218	229	179	287	338	398	667	686	600	421	363
Engineers	719	696	558	562	515	355	630	1,329	1,216	1,290	1,079	962	770	798
Gardeners	538	371	390	421	331	239	260	377	957	917	981	887	599	523
Glaziers	80	91	59	57	78	41	31	82	244	190	263	112	111	118
Iron workers	1,482	671	550	384	268	79	153	528	438	419	309	354	291	413
Jewelers	243	217	201	160	174	117	125	272	317	295	200	189	165	154
Locksmiths	297	237	200	291	202	349	141	198	642	840	1,230	967	554	389
Machinists	358	268	475	292	292	284	208	592	641	375	191	232	365	202
Mariners	1,862	1,934	2,056	1,224	1,329	871	905	1,458	1,589	1,911	1,844	1,742	1,477	1,803
Masons	4,478	4,293	2,650	1,713	1,303	642	671	2,033	3,203	4,279	2,959	2,562	1,893	1,835
Mechanics (not stated)	2,242	899	471	404	268	343	786	3,309	4,109	4,325	4,156	2,534	2,019	1,896
Millers	573	419	243	197	186	163	206	442	842	1,027	876	839	570	439

TABLE E, E—Continued.

OCCUPATION.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.	1886.
Miners	5,716	4,926	4,055	2,237	1,070	1,578	2,588	6,086	5,204	6,485	4,743	3,794	2,440	3,489
Painters	1,055	564	585	440	386	252	450	898	1,342	1,422	1,107	1,306	929	771
Plasterers	161	204	49	436	110	21	40	90	329	284	163	173	99	203
Plumbers	285	158	103	98	67	21	40	143	185	288	241	172	163	180
Printers	317	284	397	152	151	86	165	208	371	549	369	464	521	251
Saddlers and harnessmakers	334	405	233	136	73	135	126	219	441	529	470	464	285	293
Seamstresses	350	414	464	287	399	365	166	379	685	475	628	567	517	438
Shipwrights	314	1,503	539	103	336	170	100	571	288	155	90	94	86	17
Shoemakers	2,411	1,639	1,265	898	680	777	1,119	1,849	3,967	4,363	3,263	2,931	2,130	1,681
Spinners	270	170	192	110	72	83	95	210	465	2,431	3,589	2,646	1,000	296
Stonecutters	529	298	644	290	529	158	113	328	433	551	470	481	341	335
Tailors	2,393	1,397	1,463	909	668	815	1,062	2,134	3,106	3,748	3,245	3,317	2,228	2,682
Tanners and curriers	144	142	146	108	161	78	100	171	272	313	336	202	151	128
Tinners	327	341	278	215	156	91	105	157	402	346	347	568	323	192
Tobacco manufacturers	675	544	713	384	425	317	478	515	1,684	1,045	655	1,506	1,300	1,100
Watch and clock	234	158	154	158	159	113	149	299	344	443	404	364	306	307
Weavers	1,357	892	776	454	354	292	515	1,409	1,689	1,643	1,679	1,359	1,006	989
Wheelwrights	255	109	94	94	109	23	30	144	275	239	291	229	130	107
All others (not stated)	3,849	3,219	4,765	3,839	3,793	1,476	1,581	4,135	3,524	3,881	4,106	3,097	2,363	2,478
Total skilled	48,792	38,700	33,803	24,200	21,006	16,531	21,362	49,929	61,457	72,764	62,505	55,061	39,817	36,522
Agents, factors	119	107	59	70	46	34	66	52	122	159	123	136	125	139
Bankers	32	21	23	29	36	24	28	13	33	56	12	18	60	34
Cooks	293	215	284	231	157	241	226	220	450	539	434	271	312	314
Farmers	36,983	28,775	16,447	14,536	13,188	14,843	19,907	47,204	58,028	61,888	39,048	42,050	27,385	20,600
Grocers	300	198	161	187	131	119	104	240	293	398	362	246	236	232
Hotel keepers	104	56	80	158	131	81	143	103	157	144	384	769	416	169
Laborers	104,423	65,895	46,877	38,847	25,482	26,656	36,897	103,012	147,816	200,005	136,071	106,478	83,068	86,853
Merchants	7,058	5,259	4,706	4,519	4,239	4,217	4,861	7,508	8,768	9,375	7,449	6,522	5,870	5,733
Servants	16,259	12,427	10,579	6,493	5,158	6,157	6,804	18,580	13,342	22,010	27,988	24,249	20,213	20,198
Shepherds	291	129	69	31	58	44	34	60	486	312	214	190	81	49
All others (not stated)	2,942	3,959	5,261	7,174	6,940	5,390	3,983	9,117	8,999	5,045	4,014	3,266	3,730	3,400
Total miscellaneous	108,724	117,041	84,546	72,275	55,650	57,806	73,053	188,109	244,492	310,501	216,049	184,195	141,702	137,551

GRAND MASTER POWDERLY ON APPRENTICESHIP.

T. V. Powderly, Esq., of Scranton, Pennsylvania, Grand Master Workman of the Knights of Labor, in an article headed "Settle the Apprenticeship Question by Inaugurating Industrial Schools," says:

From a paper before me I take the following paragraph. It appears to furnish food for reflection and study:

A very serious question confronts the American youth under the existing restrictive system of apprenticeship. What is to become of the millions of boys who, having finished going to school, are looking about for something to do?

This subject is worthy of the best thought of the most profound thinkers of our time, and I make bold to discuss it briefly, in the hope that my words, which, at best, will serve but as an introduction, may cause others to take up the question itself for discussion.

Have we a restrictive system of apprenticeship in the United States? I fail to find it in operation in many of the trades and callings, and in many others it exists only in name. Its effect on limiting the number of apprentices is scarcely felt in the trade. It is frequently urged that the restrictive system of apprenticeship is driving the American youth from the skilled callings; that the native born is being driven from the workshop to make room for the workmen of foreign birth. It is held by many that the trade union is to blame for this state of affairs; that the American labor organization is inimical to the interests of the American workman. When the mechanic worked steadily for six days in the week to perform a certain amount of work by hand, it was necessary for him to know the use of tools; in order to fit himself for the performance of such a task he had to bind himself to the employer for a term of years, during which time he was taught the rudiments of his trade. He worked for a pittance in the hope of one day being able to take his place at the bench as a journeyman. It made no difference whether he learned the machinist, blacksmith, molding, cooper, or shoemaking trade, they were all hard to acquire, and the mechanics of twenty or fifteen years ago had to learn the whole trade in order to take his proper place by the side of other mechanics when out of his time and upon the road as a journeyman. At present it is waste of time to bind a boy to any of these trades, or to any particular trade, for the reason that they are all subdivided to such an extent that men are set to work on special pieces on entering the workshop, and remain in that particular subdivision during their term of service. The chief aim of the employer in engaging apprentices is to secure the assistance of cheap help on work that it is not necessary to employ competent mechanics to perform. The opposition of the mechanic to a number of apprentices is that the market may not find too many craftsmen in search of employment; under such conditions wages must have a downward tendency.

An apprentice in 1888 does not enter upon the trade as the apprentice of 1858 did. In 1858 the apprentice learned all of the "arts and mysteries" of the trade, while the beginner of to-day is placed at a machine and is apt to be kept at it during his entire term of apprenticeship. If he is skillful, and manipulates that machine to good advantage, he is more likely to be of better service to his employer than if he were allowed to take turns at all the different branches of the trade; but when his term expires he is of but little use as a mechanic, for should he apply to another employer for a situation, he may not be lucky enough to find employment at a machine similar to the one at which he served his term, and if he is not so employed, he will have to wait till a vacancy occurs, or tramp.

During the period from 1859 to 1875 trades unionism flourished more than at any other time in our history; it was during that period that the greatest opposition to an unlimited number of apprentices was manifested by the mechanics of the United States. During that same period the employers of labor learned to go to foreign lands to secure the services of mechanics who would engage to take the places of the American workmen. The employer was not forced to go abroad for workmen, but he regarded the trade society as a foreign institution, and would not recognize it in dealing with his employes. He was inconsistent, however, in going to Europe for workmen who were none the less foreign because he imported them.

During the past ten years, which may justly be styled the decade of the iron man, the importation of foreign workmen by employers was practiced on a most extensive scale. During this same period trades unionism languished in the United States and played but a small part in dictating to employers how many apprentices they should engage; yet employers imported foreign laborers in such numbers as to arouse the American workmen to a sense of danger, when they began to rebuild their shattered organizations, in which work they were encouraged by the Knights of Labor, the latter organization having secured the passage of a law which, although frequently violated by employers, has for its object the prohibition of the importation of foreign labor under contract. The argument that trades unionism is to blame for the presence of so many foreign born mechanics in our workshops is not worthy of consideration. The truth plainly stated is, that every foreigner who is to-day at work in the workshops of the United States is here because he believed he could improve his condition by coming, or is here because he was induced to come by some agent, or bureau, in the interest of the employers of labor in the United States.

It is neither profitable nor encouraging to learn a trade when the chances are that some morning the mechanic will awake to find a machine standing in his place doing the work which he performed the day before. Inventions have been introduced so rapidly and extensively during the last ten years that many trades have been almost revolutionized. This rapid introduction of machinery has had a tendency to depress wages; the reduction in wages and the lack of security in workshop management has been the cause of sending many a boy to college who would have gone into the workshop after passing through the routine of the common public school.

Americans believe that they live in the best country in the world; the workman being imbued with that sentiment believes that he should receive the best wages in the world. The employer, who may be as proud of his country as the workman, when it comes to a question of employing an American because he is a countryman, or securing the services of cheap workmen, will cast his lot with the foreign workman and the dollars-and-cents side of the question. The foreign workman, not knowing what his services ought to bring in this land, will step in the shoes of the American workman who received from \$2 50 to \$3 a day, and be recompensed at a rate not exceeding \$1 50 or \$1 75 a day. Having lived where it was necessary to practice the most rigid economy, he brings his economical habits and ideas with him, and for a time he can exist on the wages paid him.

We also find the manufactories of the United States being operated as though they were the property of one management. The tendency is to bring them under one common head through the agency of the "trust." Independence on the part of the workman is being crushed out, for he has only to work in one mill, workshop, or factory in one part of the country and he becomes known all over. This system, although in its infancy,

bids fair to become so perfected that it will be impossible for a man to work in any part of the country if his last employer is dissatisfied with him. The tendency throughout for the past few years has been to discourage the American youth when he sought to learn a trade. He is unwilling to spend years in acquiring knowledge which may never be of service to him. The colleges and universities are full to overflowing, and soon the professions will be as crowded as the trades are to-day.

This is an age of revolution and evolution. It is the most marvelous age the world has ever witnessed, and nothing that has gone before can be compared to it, or cited as an indication of what is to follow. We cannot with any degree of accuracy predict anything for the future; we grope and fear to risk too much, lest some new invention completely upsets all our plans and gives the winning hand to another. We find American youths unwilling to learn trades because they do not bring rich rewards or assurances of stability of employment. There is a fascination about the large cities which they did not bear some years ago, and, taking it altogether, we find ourselves in a state of transition almost impossible to describe. What the man of ante bellum days regarded as a luxury is to-day an absolute necessity. Take a look at the room in which you sit when this is read and contrast it with what your surroundings would have been in 1858, just thirty years ago; note the changes which time has worked, not alone in the appearance of the room, but in that of its occupants. Once we put a little oil in a saucer, hung a rag over the edge, struck the flints together and ignited the rag. With such a light our reading and sewing were done. Then we ran the tallow into the mold and made the candle; we next ran the fluid into the lamp, and stood back in awe to see it burn; after that gas began to work its way beneath our sidewalks and into our sitting rooms; then the old Drake farm was tapped, and the world was astounded to find itself burning the product of the earth after the refiner changed its color. Then we said, we can go no farther, and found our words were contradicted by a glare of light which almost rivaled the noonday sun, and electricity flashed itself into favor. [At eleven o'clock at night I saw a man painting a sign on Chestnut Street, Philadelphia, without the aid of lamp or torch; electricity answered every purpose.]

Ten short years ago we wrote our letter, or, if we were in a hurry, we telegraphed to our friends; to-day we call up the exchange and talk across cities and counties. Soon States will be traversed by the sound of the human voice. To-day we talk into a funnel, and not only are the words recorded, but the very sound and quiver of the voice is faithfully preserved, to be repeated as often as may be required at any time during our lives or after death. We stop and ask, What next? The answer comes with the rapidity of lightning from some quarter of the universe in the shape of a new invention. What has this to do with the American youth? Everything, for we must devote more time to him than heretofore, so that he may not, Micawber like, stand in idleness waiting for something to turn up. Let us turn it up for him by inaugurating a system of industrial schools in which the arts, the sciences, and trades will be taught. Surely the American youth is worthy of the best that we can do for him, and we should encourage him in his first steps, that his later ones may be for the good of the nation. At the rate at which science is advancing, there will soon be no shoveling of earth, no leveling of hills by hand, no digging of trenches, no cutting of earth, or wood, or iron by hand; all of these things, and all else that enters into the industry of the world, will be done by the aid of science. There will be no trades or tradesmen of any special callings or crafts. In the world's production nothing should be missing, nor

should one man have an advantage over another which nature does not give him. We will have men of no particular trade, but all men will know all crafts; not the "Jack of all trades," but a far different being who knows all trades well. Every schoolroom should be a workshop, a laboratory, and an art gallery. At present a trade learned is a trade lost, for the learner does not have an opportunity to practice but one part of his calling, and if thrown out of that one groove cannot fall into another. Under an industrial system of schooling every American youth will know sufficient of all trades to step into whatever opens itself to him, and he will not be forced by circumstances to stand in the way of another who is anxious to rise, but will be fitted to take a step forward at a moment's notice. He will always find work to do, and will do it more rapidly, with better tools, and for a greater reward than the artisan of the present. The unsettled conditions which now make trades unionism a necessity will vanish, and in that age there will be but one organization necessary—the fatherhood of God and the brotherhood of man.

PART V.

MANUAL AND TECHNICAL TRAINING.

CHAPTER I.

MANUAL TRAINING.

From what has been said about apprenticeship, it is evident that as it has gone out of the fashion, something else must take its place, or, if not, how shall we supply our workshops, and who shall take the places of the artisans of to-day? It is of no use trying to bring back the old style of long term apprenticeship.

The American youth of the present day will not submit to compulsion and supervision at the hands of any master, and the business of our Courts would be clogged with cases of "employers versus runaway apprentices," if the latter were bound by iron-clad indentures. Our boys, and our girls, too, want a place where they can earn wages from the start, and when they have acquired a "smattering" knowledge of the trade will look out for another place where they can get higher wages. Employers are also adverse to legal and personal responsibility for apprentices, and are careful to insert a clause in every contract or indenture which relieves them from the responsibility of instructing their apprentices personally. What substitute then can be found for a system which is no longer acceptable to employer, parent, guardian, boy, or girl? Are we to look to foreign countries for skilled workmen in the various branches of mechanics and arts, and, if not, by what means can we train our youth in them?

This is the question which is now agitating the minds of educators, statesmen, publicists, and of all interested in the welfare of our youth. There is a consensus of opinion as to the necessity of some practical system which shall fit young people for the way to earn a living and carve out a prosperous career.

The present system of education is strongly biased in favor of professional and literary pursuits, to which there would be no objection were every man's vocation in life law, medicine, theology, or other kindred vocations.

But the great majority of youth are not intended for these callings. They must earn their bread by the sweat of their brow and be producers. The professions and clerical employments are overstocked, and many of them earn very precarious livings, waiting, Micawber like, for something to turn up. The condition of our girls especially is deplorable. Many of them have been brought up to look down upon labor, and their only hope is in marrying a man who can provide for them. Not five per cent of them are taught any skilled trade. If the hand and eye were educated as well as the head during school time, children would be taught to respect labor. The principal reason why the professional man is looked up to and respected, is because the former is something outside of his pursuit. He

is generally a man of culture, while the mechanic is the contrary. There should be as much honor and credit attached to the making of a fine piece of cabinet work as the drawing up of a bill of exceptions, but very few people think so. They are apt to associate in their minds the use of tools with dirty face and hands, and never stop to consider what creative powers may be behind these. We have High Schools, Normal Schools, Colleges, and a State University, to all of which State aid is extended with a lavish hand, for preparing youth, male and female, for the learned professions.

If a boy or a girl wishes to become a lawyer, doctor, etc., the road is clear and open before them without any demand for toll on the way. Inducements are held out to them in the way of prizes, scholarships, etc.

But if some boy or girl wished instead to become a skilled artisan, to acquire a knowledge of how to design, and how to decorate, and make beautiful articles out of wood and metal, they would not know which way to turn. The State has made no provision for preparing the would be mechanic to start upon his career well made up. The would be professional leaves school with a good stock of necessities for his journey, but the embryo mechanic goes out of doors with empty knapsack. It was owing to the foresight and philanthropy of a private individual, Doctor Cogswell, that the boys and girls of San Francisco have an institution where they can be fitted out with a well stocked budget of mixed mental and manual provisions.

GOVERNOR BARTLETT ON MANUAL TRAINING.

Our late deeply lamented Governor, Washington Bartlett, with that keen perception of the necessities of the times and tender solicitude for the advancement of the children of the State which characterized him, brought the subject to the attention of the Legislature in his inaugural address in these words:

I desire to call your special attention to that part of the report which refers to work schools, or industrial training. The subject is becoming one of absorbing interest to all good citizens. The success which has followed the establishment of such schools in St. Louis, Chicago, Cincinnati, Philadelphia, Boston, and New York, proves that they are meeting a real want in the community.

It is admitted by the more thoughtful and philosophic educators that the present system of public schools is based too largely on the old scholastic systems of learning. Our most scholarly men, the educators of our country, from the Presidents and faculties of our universities to the public school teachers, are, from the nature of their position, removed from the active business pursuits of the great mass of the people, and cannot be expected to instruct their pupils in arts and trades of which they themselves have little knowledge or experience. Their education has made them love learning in the abstract more than the sciences, as applied to daily life. Their influence tends to foster a love for books and literary or professional life, so that the majority of their students who are able to graduate, aspire to the professions of law or medicine, or other scholarly pursuits.

The great mass of our public school children are obliged to assist their parents when they leave the grammar schools, so that the primary schools are really of the very greatest importance in their education.

It is generally conceded by those who have studied the subject most thoroughly, that Froebel's method of training all the faculties of the child, is the most perfect of any that has been yet devised.

Hence, it seems to me, that the students of the State Normal Schools should be thoroughly instructed in this system, so that in due time all parts of the State could be supplied with primary teachers, competent to lay the foundation for a thorough education, developing the mechanical and artistic faculties, as well as the purely intellectual.

The efforts already being made by the people for establishing manual and technical schools should also be liberally encouraged. The technical departments of the University should be made as valuable as possible to the people throughout the State. It would be well to offer special inducements to public school students to arouse a greater interest in the industrial arts and sciences.

The vast agricultural, manufacturing, and mining interests of the State need the most enlightened treatment, in order to compete in the markets of the world. It is but just to those who are to conduct these interests in the future that they should be prepared in

as full a measure as possible to meet such great responsibilities. I would suggest, therefore, that your Committee on Education should make a thorough investigation as to the wants of the people in the way of better industrial training, and the best way of meeting those wants.

There would seem to be no limits to the natural resources of bountiful Nature in our State. All we need is skill to develop them. All the governments of Europe are making great efforts to educate their people. Schools of weaving and pottery, of chemical products, of dyeing, of all kinds of manufactures, in fact, are now in successful operation in Germany, Austria, and France. England is following their example.

American laborers are already feeling the presence of sharp competition, so that in self-defense we will soon, as a nation, be compelled to exercise all our powers to meet the requirements of the age and maintain the proud supremacy which American laborers have hitherto held in the world. California has always generously rewarded labor; let us liberally provide now for the best education of the children of laborers, so that our Golden Gate may ever be hospitably open and the white sails of commerce carry, not only grains and fruits, and the raw products of the State, but the ingenious and artistic productions of skillful hands and cultured, fertile intellects.

Our public school system is justly considered one of the noblest features of our great republic.

There is nothing to compare with it in any Government of the world, but this superiority is passing into history, and our educational system of to-day does not come up to our present needs. It does well enough as the first step for those who will enter professional, educational, and commercial pursuits, but there is no provision for the artisan, no hand guiding his course.

The idea is growing stronger, day by day, that public school education should not be limited to what is commonly called "book learning," and that something must be added to prepare our youth for manual labor. European nations that have lagged behind us in popular education are ahead in teaching youth things essential for the future skilled artisan.

The International Exhibition of 1851 opened the eyes of Englishmen to their lack of knowledge in the highest grades of mechanical labor. They saw the exhibits of France, Belgium, Germany, and other countries of Europe, and knew they could not compete with them in work where a high degree of culture was required. With their proverbial pluck and enterprise, they set to work establishing industrial and technical schools, with the result of being able to rival their guides and models.

OBJECTIONS TO MANUAL TRAINING IN OUR PUBLIC SCHOOLS.

Many well meaning people belong to the "doubting Thomas" school, and doubt the feasibility of bringing together such incongruous elements as arithmetic and carpentry, history and blacksmithing. It upsets completely all their old time notions of a set order of business, properly divided between recitations, exercises on the blackboard, writing, and recess. To introduce anything like molding, planing, hammering with nails, etc., would be highly nonsensical, and would demoralize the school.

It may do well enough for mere pastime during recess hours, but, even then, it would only have the effect of taking the mind of the pupil off his book studies.

Besides, they say, "Who is going to teach all this stuff included in manual training?" "A teacher has all he or she can do to master the literary studies required for a diploma without being obliged to know half a dozen different trades." "And how can a teacher, after having her hands dirtied all over with clay after teaching a class how to mold, take up a clean text or copybook in her hands?"

In spite of all these ghosts or fantasies (for such they are found to be in the light of practical experience in the actual working of the manual training school) the work can be done and satisfactorily.

The great economist, Stephen A. Walker, said: "Education of the hand and the eye should go along with *pari passu* the education of the mind. We believe in making good workmen as well as in making educated intellects. We think these are things that can be done at the same time, and our proposition is that they can be done better together than separately."

Among a certain crabbed, narrow minded, "hard shell" class of people, there is a disposition to cavil at any new departure in the line of education.

"Let well enough alone" is their motto. "Our fathers and our grandfathers, our mothers and our grandmothers," they say, "went to the village school and learnt the three R's—reading, 'riting, and 'rithmetic—and what was good enough for them ought to be good enough for us." "They were happy and prosperous under the old system and why should not we," and so on? Such people have a mortal dread of "new fangled" ideas.

Another argument against manual training is that the pupils of the public schools are already worked up to the limit of their endurance, and that no addition can be made to the present course of study without violating the ordinance of "cruelty to animals."

The criticism misses completely the point of the argument in favor of manual training, which is that it lightens instead of increasing the burden on the pupil. The change from the book to the bench relieves the monotony of school work, and experience has shown that pupils freely give one or two hours additional of their time to tool work. The workshop gives about as much relief to the manual training pupils as the playground to others. The old system, while it takes up the time of the pupil, does not train all the pupils' faculties. It devotes itself almost entirely to the education of the receptive, and allots very little time to the training of the expressive faculties.

Still another class, with some show of reason, express doubts as to the successful issue of an extension of the public school curriculum in the direction of training the hand and eye. They say the public school teacher has all he can do in educating the mind, and anything outside of that should be done elsewhere. The majority of children leave school before they reach the age of fifteen, and where is the time to instruct them in anything outside of the essentials which are required to befit them for their duties as good citizens. In spite of all these croakers and objectors, the knowledge of the necessity for action, for *immediate* action, is rapidly growing. Modern discoveries and inventions have developed a great many new departments of labor, and public education must keep step with the onward march of improvement in almost every walk of life.

If the children of the working classes can be initiated into the methods of labor, by which afterwards they must earn their living, without interfering with or lessening their usual book studies, it will be a great boon to the rising generation.

That this can be done is conclusively proved by the success attending work in said direction, not only in Europe, but in the United States.

OBJECTIONS ANSWERED.

Professor Woodward, of the St. Louis Manual Training School, stated before the Teachers Convention in San Francisco, that the first five pupils on the list of graduates of the Washington University of St. Louis were pupils who had taken a manual training course. He asserted that instead of retarding a boy or girl in ordinary school work, manual training, on the contrary, gave them an impetus.

Professor J. M. Ordway, of the Tulane High School, New Orleans, speaking of the manual training in his school, says: "The pupils do not lose time which ought to be devoted to intellectual studies, for it is found that without over-exertion they accomplish quite as much in these studies as they did before hand work was introduced. They gain by alternating hand work with pure brain work, and thus resting without being idle."

Mr. James A. Page, of the Dwight Grammar School of Boston, where manual training is successfully practiced, says: "I consider that the results go far to prove that manual training is so great a relief to the iteration of school work that it is a positive benefit, rather than a detriment to the course of other studies."

The "Toledo Blade" newspaper, speaking of the graduating students of the Scott Manual Training School (which forms a complement of the Toledo High School), says: "One remarkable fact is that so many who won honors were students in the Manual Training School. More boys graduated this year than ever before in the history of the school."

I could go on multiplying testimony to the same effect, but the extracts given ought to be sufficient to convince the "Let well enough alone" and "I'm afraid" classes of people, that no harm is likely to ensue from the introduction into our school system of something beyond the book, slate, and pen. It is not intended to supersede these indispensable articles. No advocate of manual training was ever so transported with zeal as to even suggest that the public school should be converted into technical or trades schools, or that books should be driven out by tools. The proposition is to *add to*, not to *take from* the studies and the instruments of study already in use in certain grades of school.

Some persons are afraid of what they call over-education, and look upon manual training as a work of supererogation or accomplishment. In this they are greatly mistaken. Labor Commissioner Charles F. Peck, of New York, says: "To draw is as easy as to write; and, in some sense, as useful. To use tools in a rudimentary way is good for boys, as needlework is for girls. Familiarity with tools of trade is the basis of all mechanical occupations. The children of the poor, in whose behalf the disadvantages of superfluous education is urged, are precisely those who would draw most gain from early mechanical teaching. They *must* use tools; and instead of finding their fingers all thumbs when they take to tools for a living, they have already obtained a notion of their uses, their entrance on life duties is thus made all the easier, and the days for waiting for a chance to turn up are shortened. A youngster who cannot master language or grammar may be smart at figures. Another child who cannot get hold of an abstract idea will brighten up and understand a concrete fact—a picture, a model, or even a map. Artists or artisans often get their best ideas by thought and observation, rather than by verbal teaching. An Edison cannot be made from books and class lessons."

NECESSITY FOR INDUSTRIAL TRAINING.

In almost every community the question of technical education has been discussed, and ghost after ghost of doubt and difficulty has been laid by the test of practical experience. "How often," says Professor Woodward, of St. Louis, "has life been a failure from defective education? I have seen poor lawyers who, under a proper system of training, would have made excellent mechanics, and not a few of highly educated, able-bodied men, actually begging for the price of a day's board. I recall one man in particular, who was able to speak several languages, but because no one would

employ him as a linguist, he must needs beg, for he knew not how to work." We want an education which will develop the whole boy or girl, not only the moral and intellectual, but the physical powers, so that they will not enter upon the battle of life "scarce half made up."

"To a certain extent," says Professor Woodward, "we have been whipped over England's back, and, though we have always prided ourselves on our enterprise and smartness as a manufacturing people, and have glorified ourselves not a little over our great system of free public schools, and on our numerous high schools and colleges, we have been forced, not only to go across the Atlantic for the finest specimens of manufactured articles, but to look to Germany and France for guidance in educational matters."

The United States Commissioner of Education, in his report for 1883, says: "Foreign skilled labor ought not to be made a reliance. Our own youth ought to be, and must be trained to occupy leading places in the arts and manufactures by means of special instruction given in schools organized for the purpose. Any system of schools or instruction which fits pupils to enter upon the duties of life and the work of a trade, promotes the practical education of the industrial classes."

In his report for 1885-86 he says: "Interest in the subject of manual training has shown no abatement during the year. Distinct progress in respect to the general understanding of the subject is noticeable. In a number of cities, public opinion seems to be prepared to give practical effect to the idea forcibly expressed by D. J. D. Runkle, of the Massachusetts Institute of Technology, that 'to give hand instruction its full educational value, it should be incorporated into the school course and pursued systematically in connection with cognate studies.'"

We want, in this practical age, not only men of knowledge, but men of skill in every department of human activity. Where do our wealthy citizens procure the finest specimens of manufactured articles; where the costly articles wrought in silver, gold, or precious stones; where the beautiful tapestries, carvings, paintings, and choice specimens of decorative art? Is it not from Europe? And if not from Europe, is not the work done here by a European trained artisan? In reply to the subjoined question addressed to prominent citizens in every county of the State:

Are skilled mechanics in your county, such as are engaged in watchmaking, gold, silver, and jewelry work, engraving, lithographing, wood cutting and carving, ornamental painting, decorating, and other high grades of mechanical labor, of American or foreign birth?

The answers returned were almost invariably "foreign."

Go into a church, hall, store, or dwelling, where wall or ceiling is being frescoed, or where artistic decoration is carried on, and you will in nine cases out of ten find foreign workmen. There is plenty of room on the top rung of the labor ladder. The lower ones are crowded. Our millionaires are on the increase. Rich men can afford to buy, and *will buy* at high figures, the work of the skilled mechanic in metal, wood, bronze, or canvas. They cannot purchase beyond a certain limit tables, chairs and the other ordinary articles of household furniture, but for the beautiful artistic productions of the skilled mechanic, where brain and culture come into play, there is no limit, and the field is vast indeed, but the laborers few.

DIVISIONS OF INDUSTRIAL EDUCATION.

The grades or classes in which the hand and eye, or physical and mechanical training enter, may be divided into four classes, and it is well to bear the distinctions in mind when the subject of manual training is discussed,

so as not to confound one class with another. They are as follows: 1. The Kindergarten; 2. The Manual Training School; 3. The Technical School; 4. The Industrial School.

The first, or the Kindergarten, teaches children of from three to seven years of age, under guise of play, a knowledge of facts by observation. No letters or books are used.

The second, or Manual Training School, combines the ordinary literary course with that of training the hand and eye to the use of tools.

The third, or the Technical School, is one to prepare students for professional work, such as architects, engineers, etc.

The fourth, or the Industrial School, is one in which trades are taught.

The first three then follow in regular rotation, the second being the complement of the first, and the third of the second. The object of the manual training school then is not to make mechanics. That is the province of the industrial or trades school. The instruction given in manual training schools shows what are the essential properties of materials and their economic values, rather than what may be called practical work in the way of manufacturing useful articles. The course of instruction in the workshop attached to the school is very broad and liberal, including work on all common varieties of wood, plaster, iron, steel, brass, etc.

Mechanical drawing is a prominent and most essential feature in the entire course. The manual training school, then, teaches the elements of a great many trades, but does not teach any one trade completely. A boy who wants to become a mechanic must go either to a trade school, or to a master mechanic, to complete the work.

MANUAL TRAINING DEFINED.

The manual training school is simply a high school with the manual feature added.

The day is probably not far distant when the high schools in every city in the United States shall be at the same time a manual training school, as is the case at present in Philadelphia, Cleveland, Baltimore, and Toledo, and other cities.

"In the grammar school," says Professor Woodward, "there should be no attempt made to do work either in the shop or in drawing, which is suitable only for the older pupils." The manual feature can be added to any high school. In all schools where it has been so added it has been found that the pupils stick to the end of the term. Such schools are full to overflowing with boys, many of whom would not have been in any school but for the manual training.

Parents take their children from school now long before they have completed their course, because they fail to see that any more schooling would make their children any better bread winners, but when they see them bring home from school some sample of their handiwork in wood, plaster, or iron, the practical benefit to be derived from continuing at school becomes apparent. Besides, they see the son or daughter, who would otherwise be idling away the time listlessly, or reading some trashy novel at home, now busy at work around the house in some useful work with tools in their hands. Parents will under such circumstances make great sacrifices to keep their children longer at school than at present, and the testimony of all who have tested it corroborates the assertion.

It may be argued, *per contra*, that a pupil who desires to learn a trade can do so after he finishes the grammar or high school course by going into some workshop as an apprentice, where he will be taught the trade

thoroughly. The withdrawing of youth, who have learned little more than the bare rudiments, from school and placing them in a workshop has lowered the standard of all mechanical pursuits, and has given rise to the notion that a mechanic needs but very little education. In apprenticeship at any kind of tool work the boy is not taught drawing as a part of his trade. Very few mechanics are good draughtsmen. Few of them can understand drawings as well as the graduates of manual training schools. An apprentice is confined to a very limited range of work, and, as was pointed out before, he is kept at the particular line of work which he has mastered to the end of his term, because in it he can be of profit to his employer. The graduate of a manual training school, on the contrary, has not been confined to the use of any particular tool or line of work, but has learned the use of many tools, and laid the foundation of any one of twenty trades to which he may choose to turn. The boy who has passed through the manual training school has learned for what occupation he has a taste, if he has any taste or bias in him.

Where all the powers of a boy are brought into play before his eyes, the principal of a school can also be better able to judge for what line of business his pupil is best adapted. Professor Woodward says: "It is a crime against freedom and humanity to put a boy fourteen or fifteen years old to learn a trade as an apprentice, and, as a rule, to commit him to that trade for life, without intelligent choice of occupation and little chance of correcting a mistake if one is made."

In a report made by a commission appointed by the Legislature of the State of New Jersey to inquire into labor matters, it is said: "Too often is the ordinary apprentice left to find out the right way by personal hard experience; but in an instruction shop, where the only duty of the expert is to teach the pupil, he learns to be a good workman much quicker than in an ordinary shop; and not only does he make more rapid progress in the right direction, but he is saved from falling into clumsy habits and methods of work."

The apprentice in a shop, under a "boss," is made to do the chores—the dirty work of the establishment. He is the fag end, the least important, and the least considered there. But in the manual training school he is the peer of his fellows. It is for him the school exists, and he is the material that must be turned out finished, and not the articles in wood, plaster, or metal, which surround him. Instead of being left to himself to pick up what he can he has competent teachers, who feel a pride in his advancement because the credit of the school is at stake.

COST OF MANUAL TRAINING.

But then what about the cost, and the many other difficulties, such as providing suitable teachers, and equipment, etc.?

The difficulties are not so great as they appear at first sight. Tool instruction is what is needed, and not how to make any particular articles—instruction in the nature, theory, and use of tools. There are only seven hand tools: the ax, the saw, the plane, the hammer, the square, the chisel, the file. Besides, there are the machine tools, which are chiefly employed in mechanical pursuits. The modest ambition of the advocate of manual training is to make pupils acquainted with the use of these tools, so as to become useful to themselves and lay the groundwork for future development. Anything beyond this must be looked for in some polytechnic or scientific school especially designed for the purpose.

In the St. Louis school it costs from \$5 to \$7 per pupil per year for

materials. The working sections of this school have from twenty to twenty-four students each, and there is a teacher for each section, but the Director "strongly insists that no community in which a manual training school has once been established would allow its expense to be an argument against it."

Taking into consideration the vast sums expended to erect and maintain State Universities, Normal Schools, and institutions for the higher order of education, the amount required to equip and support manual training schools in connection with our high schools, would appear very small, indeed. It may be well to remind those who may cavil at the expense that the common school is at the root and foundation of our national advancement, that it is for the benefit of the masses and not of the classes, and that for one who enters the university, or similar institution, ninety-nine must be content with the education afforded in the public school.

The expense incurred in establishing and running a manual training school in connection with the High School of Springfield, Massachusetts, may be taken as fairly typical of what it would be in other places. The following particulars are taken from the report of the school committee of that city for 1886. An appropriation of \$1,000 was made by the city government of Springfield for manual training by way of experiment. The basement of the high school building was selected for a workshop, and a competent teacher was engaged.

Thirteen benches designed for wood working were obtained and equipped with suitable tools for the class of work to be taught. Three large cupboards, each containing thirty-two compartments, were provided for the convenience of the pupils. The school opened on July 12, 1886, with two vacation classes of twenty-two scholars. The fall term opened with an enrollment of ninety-one scholars, which number soon increased to ninety-six, and these were divided into eight classes of twelve scholars each. It was arranged that each class should receive one lesson a week of one and one half hours' duration. The course of instruction arranged consisted of fifteen lessons, covering the use of the hammer, nail driving, measurement, use of the try-square, gauging, sawing to line, cutting to length, cutting to width, shelf making, box making, use of dividers, boring, use of bradawl, use of chisel, examples in construction, and the general use of carpenters' tools, their parts described and defined, their adjustment explained, and the pupils taught to keep them in working order. On November ninth, an additional class was organized for Saturday afternoons, consisting of twelve scholars from private schools.

The Saturday morning class has among its members four of the grammar school principals and the drawing teacher. This fact is mentioned to show the interest manifested in manual training by many of our most accomplished instructors.

The cost of the experimental training school, from its establishment to January first, is as follows:

Cost of equipment.....	\$503 19
Cost of material.....	60 11
Salary of instructor.....	231 14
Balance of appropriation, not used.....	205 56
Total.....	\$1,000 00

The remainder of the appropriation will carry the school, on the present plan, until March, 1887.

One thousand dollars were sufficient to pay the cost of equipment and

material and the salary of the instructor for nine months in this experimental attempt in manual training.

One statement in the report is very significant: "It is the testimony of the principals of the high school and the grammar schools that the time given to manual training has not retarded the pupils in their regular studies." Another is that four of the grammar school teachers were in the manual training class. From a careful estimate made by the committee, \$50 per capita yearly ought to pay the expense of maintaining in a proper manner a manual training school of one hundred pupils.

BALTIMORE TRAINING SCHOOL.

The cost of maintaining the Manual Training School of Baltimore (one of the most successful schools in the country and connected with the public schools), for the year 1887, is given as follows:

To five per cent of \$12,559 53, value of plant.....	\$627 98
To twenty-five per cent of \$2,520 91, value of books.....	630 26
To lumber and metal for lessons.....	480 00
To engine castings and wrought iron for senior class.....	115 00
To wood and coal.....	270 00
To salaries of instructor and janitor.....	6,567 50
Total.....	\$8,690 74

Number of students on the roll during the year, 352, and \$8,690 74 divided by 352—\$24 69, the cost per student. Leaving out the percentages on plant and books, we find the actual running expenses to be \$7,132 50, making the cost per student \$20 26.

THE SAN FRANCISCO HIGH SCHOOL.

The number of boys enrolled in the High School of San Francisco, according to the Secretary's report for 1886-7, was two hundred and ninety-one.

The salaries of the teachers in the Boys High School of San Francisco are as follows:

Principal.....	\$250 00
Head of English Department.....	160 00
Head of Scientific Department.....	160 00
Head of Mathematical Department.....	160 00
Head of Classical Department.....	160 00
Teacher of mechanical drawing.....	30 00
Assistant teachers.....	140 00
Total.....	\$1,060 00
Or \$12,720 per year.	

As the number of pupils on the rolls is given at two hundred and ninety-one, the cost per capita for teachers' salaries alone (leaving out all other expenses of the school) amounts to \$43 71, while the cost of the Baltimore training school, for all the running expenses, amounts to only \$20 26.

The staff of the Baltimore school consisted of a principal, four teachers in different branches of education, four instructors in different branches of manual training, one engineer, one fireman, and one janitor.

Professor Woodward, who is an excellent authority on the subject, gives the following information concerning cost of materials:

KIT OF COMMON TOOLS.

One 20-inch rip-saw, costing.....	\$1 00
One back-saw, costing.....	1 00
One claw-hammer, costing.....	40
One mallet, costing.....	25
One small steel square, costing.....	80
One 6-inch try square, costing.....	25
One marking gauge, costing.....	25
One T-bevel gauge, costing.....	25
One pair compasses, costing.....	20
One oil stone, costing.....	50
One oil can, costing.....	15
One screwdriver, costing.....	20
One bench brush, costing.....	30
Total.....	\$6 15

KIT OF INDIVIDUAL TOOLS.

One 20-inch panel cross-cut saw, costing.....	\$0 80
One jack plane, costing.....	60
One smoothing plane, costing.....	50
Four chisels, $\frac{1}{4}$ -inch, $\frac{1}{2}$ -inch, $\frac{3}{4}$ -inch, 1-inch, costing.....	90
Three gouges, $\frac{1}{4}$ -inch, $\frac{1}{2}$ -inch, 1-inch, costing.....	70
Two turning gouges, $\frac{1}{4}$ -inch, $\frac{1}{2}$ -inch, costing.....	55
Two turning chisels, $\frac{3}{8}$ -inch, $\frac{1}{2}$ -inch, costing.....	45
One parting tool, costing.....	40
One round-nose tool.....	40
One pair 5-inch calipers, costing.....	25
One 2-foot rule, costing.....	15
One oilstone slip, costing.....	15
Total.....	\$5 85

OCCASIONAL AND SPECIAL TOOLS.

One large steel square, costing.....	\$1 25
One 24-inch cross-cut saw, costing.....	1 35
One 24-inch rip-saw, costing.....	1 60
Two jointer planes, 22 inches long, costing.....	2 20
Two fore-planes, 18 inches long, costing.....	1 60
Two bit-braces, costing.....	2 50
Two sets countersinks and screwdriver, costing.....	8 20
One hatchet, costing.....	60
Two nail sets, costing.....	30
Two $\frac{1}{4}$ -inch screw taps and dies for wood, costing.....	1 60
One drawshave, costing.....	90
One spokeshave, costing.....	40
Two monkey wrenches, costing.....	1 00
One compass saw, costing.....	35
One full set of twelve wood carving tools with handles, costing.....	4 75
One glue pot complete, with lamp or steam connection, costing.....	1 50
Total.....	\$30 10

From the foregoing estimates it will be seen that the cost of the entire outfit of the shop (excluding power and power attachments) for seventy-two boys may be given approximately as follows:

Twenty-five benches at \$15.....	\$375 00
Twenty-five sets "common" tools at \$6 15.....	153 75
Seventy-three sets "individual" tools at \$5 85.....	427 05
Set of special and occasional tools.....	30 10
Grindstones, with attachments.....	40 00
Wash-trough, dishes, plumbing, etc., say.....	70 00
Total.....	\$1,105 90

WHERE TEACHERS ARE TO COME FROM.

As to the difficulty of procuring suitable teachers, that, in time, would regulate itself. The attempt to establish manual training schools in con-

nection with our high schools, would necessarily be slow and gradual, and the necessary time would be given for the proper training of teachers in our normal schools. No doubt a sufficient number of teachers, graduates of polytechnic schools, could be found to fill all present requirements.

ORIGIN AND GROWTH OF MANUAL TRAINING.

The following brief sketch of the origin and growth of the manual training element in the educational system of the United States is taken chiefly from Professor Woodward's excellent work on "The Manual Training School."

In 1865, John Boynton, of Templeton, Massachusetts, gave \$100,000 for the endowment and perpetual support of a free institute for the youth of Worcester County, Massachusetts. He thus explained his objects: "The aim of this school shall ever be the instruction of youth in those branches of education not usually taught in the public schools which are essential and best adapted to train the young for practical life."

It was opened in 1868 as a technical school of about college grade, and is known as the "Worcester Free Institute."

In 1870 a wood working shop was added to the appliances for the course in architecture, and an iron working shop to the course in mechanical engineering, in the University of Illinois.

In 1871 the Stevens Institute of Hoboken, munificently endowed by Edwin A. Stevens as a school of mechanical engineering, fitted up a series of shops for the use of its students.

In 1872 a large shop in the Polytechnic School of the St. Louis University was equipped with work benches, two lathes, a forge, a gear cutter, and full sets of carpenters, machinists, and forging tools.

In 1879 the St. Louis Manual Training School was established.

In 1883 the Baltimore Manual Training School, a public school on the same footing as the high school, was opened.

In 1884 the Chicago Manual Training School, established as an incorporated school by the Commercial Club of that city, was opened.

In 1884 manual training was introduced into the high school of Eau Claire, Wisconsin.

In 1884 the Scott Manual Training School was organized as a part of the high school of Toledo.

In 1884 manual training was introduced into the College (High School) of the City of New York.

In 1884 the Lincoln Grammar School, Oakland, introduced manual training.

In 1884 the Grammercy Park Tool-House, of New York, was opened.

In 1885 the Philadelphia Manual Training School, a public high school, was opened.

In 1885 the Omaha high school introduced manual training.

In 1885 the Manual Training School of Denver University was opened as a preparatory school, and in 1886 tuition in it was made free to Colorado boys.

In 1885 the Cleveland Manual Training School was incorporated and opened, in connection with the high school of that city, in 1886.

In 1886, New Haven, which had for some time encouraged the use of tools by the pupils of several of its grammar schools, opened a regular shop and furnished systematic instruction in tool work.

In 1886 the West Side High School of Chicago added manual training to its course.

In 1886 the Technical School of Cincinnati was opened. It is in all but name a manual training school.

In 1887 manual training was introduced into the high school of Minneapolis.

Swatmore College, near Philadelphia, has had for three years regular manual training.

Dr. Adler's Workingman's School for poor children has for several years taught manual training to the very lowest grades.

The Tulane High School, a preparatory department of the Tulane University, New Orleans, has been established as a regular manual training school.

In 1888, August 6, the Cogswell Polytechnic College, in San Francisco, was opened.

REPORT OF UNITED STATES COMMISSIONER OF EDUCATION.

The report of the United States Commissioner of Education for 1885-86 gives tabulated statistics relating to fourteen manual training schools as follows, but not in the order of their foundation:

TABLE F F.

Statistics of Manual Training Schools for 1885-86.

	NAME.	Industries Taught.	Year Established.
1	Haish Manual Training School, Denver, Col.	Mechanical drawing, blacksmithing, carpentering, wood turning, and pattern making.	1885
2	Chicago Manual Training School.	Wood and metal work and drawing.	1883
3	Manual Training School of Tulane University, New Orleans.		
4	Baltimore Manual Training School.	Drawing, carpentry, wood turning, drilling, planing, pattern making, etc.	1884
5	Manual Training School of Public High School, Boston, Mass.		1885
6	Artisans Training School (University of Minnesota)		
7	Manual Training School of Washington University, St. Louis, Mo.	Wood and metal work.	1879
8	Industrial Department, College of New York City.	Wood and metal working.	1883
9	Workingman's School (Heb. Soc. Ethic. Culture), New York.		1880
10	Cleveland Manual Training School.	Carpentry, wood turning, pattern making, forging, and machine shop work.	1886
11	Scott Manual Training School (Toledo University)		1885
12	Manual Training School, Philadelphia.	Carpentry, smithing, forging, molding, pattern making, wood turning, wood carving, study of steam engines, etc.	1885
13	Course in Manual Technology Vanderbilt University, Nashville, Tennessee.		1884
14	Miller Manual Labor School, Crozet, Virginia.	Mechanic arts and agriculture.	1878

BUSINESS COLLEGES AND SCHOOLS.

Heretofore we have devoted much attention to the training of youth for mercantile and commercial pursuits. The system of instruction in our

public schools seems specially designed for the benefit of those who intend to follow such pursuits. Besides the public schools, a large number of private schools, colleges, and institutes have been established for special instruction in penmanship, bookkeeping, accounts, banking, telegraphy, shorthand, type writing, etc. The following is a comparative exhibit of schools for business training, as reported to the United States Bureau of Education at Washington, for each year from 1876 to 1886, inclusive:

BUSINESS OR COMMERCIAL COLLEGES.

	1876.	1877.	1878.	1879.	1880.
Number of institutions.....	137	134	129	144	162
Number of instructors.....	599	568	527	535	619
Number of students.....	25,234	23,496	21,048	22,621	27,146
	1881.	1882.	1884.	1885.	1886.
Number of institutions.....	202	217	221	232	239
Number of instructors.....	794	955	1,015	1,099	1,040
Number of students.....	34,414	44,834	44,047	43,706	47,176

The same report from the United States Commissioner of Education gives the following summary of the number of pupils, etc., in all kinds of industrial and manual training schools:

TABLE G G.

Industrial training in various forms. Summary of the statistics of schools giving industrial training in various forms.

CLASS OF SCHOOLS.	Number of Schools Reporting.....	Instructors.....	STUDENTS.			Volumes in Libraries.....	Income.....	Expenditure.....
			Total.....	Male.....	Female.....			
For white youth.....	26	321	9,530	3,223	6,041	8,343	\$266,032	\$320,590
For colored youth.....	11	59	782	280	502	16,903	38,418	37,107
For Indians.....	12	139	1,444	924	520	3,684	236,068	208,565
Manual training schools.....	14	63	1,544	1,328	216	4,450	133,980	123,950
Totals.....	63	582	13,300	5,755	7,279	33,380	\$674,498	\$690,212

The number of students in business colleges is, according to this exhibit, nearly four times greater than the number receiving industrial and manual training. In other words, we have four pupils being trained to become clerks to the one trained to become a mechanic in schools.

WHERE MECHANICS COME FROM.

In the chapter on apprenticeship it can be seen by reference to the table showing the number of immigrants by occupations, that the average number of skilled artisans arriving in the United States is about fifty thousand per annum.

The total number of students receiving industrial training in the United

States is thirteen thousand. From this number should be deducted one thousand five hundred and forty-four manual training scholars, for they are not taught trades, and we find the number of students who are taught trades in the industrial schools of the country amounts to eleven thousand four hundred and fifty-six. Taking three years as a *minimum* course for a scholar to learn a trade, it will be seen that these schools turn out about four thousand skilled laborers per year. But these include both sexes.

It was shown in a former chapter that less than 5 per cent of the skilled class of immigrants were females, so that the average number of mechanics arriving in the United States would be in the neighborhood of forty-five thousand per annum.

The number of male students receiving instruction in the industrial schools of the United States is only five thousand seven hundred and fifty-five. Deducting the number of manual training pupils, one thousand three hundred and twenty-eight, and we find there were, in 1886, four thousand four hundred and twenty-seven boys learning trades in our industrial schools.

The latter would therefore turn out about one thousand five hundred mechanics every year, or one thirtieth of the number we receive into this country from Europe. It can be seen by these figures what little ground there is for the fear entertained by some mechanics that the establishment of manual and industrial schools will deluge the labor market and injure the trades. Thirty times the present capacity of turning out mechanics in this country will be required before we can equal the number that are added to the body of mechanics yearly by immigration.

Instead, then, of protesting against the establishment of manual training and technical schools in the United States, would it not be more profitable for this class of objectors, or "growlers," to turn their attention to the immigration problem? It is the old story of trying to stop a leakage at the spigot hole and allowing it to run at the bung.

OBJECTIONS OF TRADES UNIONS TO MANUAL TRAINING SCHOOLS.

The strongest, most reasonable, and most pointed objections on the part of the trades unions are well summed up by one of them in these words:

We believe that a training such as a boy would receive there must, of necessity, be largely theoretical, and that the boy when turned out from the schools, owing to the lack of actual practice in the application of the theories they had learned, would, for a time, form a goodly proportion of that curse of all trades, incompetent mechanics.

They would form a factor that could be readily utilized by unscrupulous employers in their never ceasing efforts to crush the workmen, as they would be compelled by their necessities to work for a lesser remuneration than the standard wages of the trade they had studied.

There is much force in these objections. It is most likely that in every manual training school some drones will be found who will not finish the course, or, if so, get through by some cramming or sneaking process.

Others will drop off before half through. They are likely to fulfill the predictions above referred to, by becoming barnacles on a trade of which they acquired a smattering knowledge at school.

From the statements of all who have had experience in manual training and its results, the contrary effects to those apprehended by some unions actually occur. Scholars who have passed through the whole course of the manual training school creditably, from the education they have received, quickly advance themselves to positions of credit in the craft they join. Instead of degrading or dragging it down they try to elevate it. It must

be evident that a young man, with a good, solid, grammar or high school education, who also is a good draughtsman, and has received a practical training in the use of tools and general mechanism, will not be content to fall into the class of mere "helpers" and be looked upon as a "scab" by mechanics inferior to himself in mental acquirements. The probabilities are, and time will so prove, that the establishment of manual training schools will have the effect of elevating and dignifying mechanical labor. It will mix more brain with muscle, and the class of mechanics that will there receive their initiatory or fundamental knowledge will be men who will not be likely to allow themselves to be kept under heel.

As Professor Woodward well says: "The boys educated in manual training schools will never become mere machine men. They will never be content, whatever the vocation to which circumstances and their own fitness may call them, to put their brains away like a piece of ornamental toggery for which they have no daily use. They have many chances in their favor. They have fast hold of a ladder, which, with vigorous climbing, will carry them to the top."

Besides, it must be borne in mind that the manual training schools do not teach trades, nor do all their graduates become mechanics after they leave the school. As many, if not more, become professional and business men. A large number become farmers.

In a manual training school which graduates, say, fifty students a year, it is probable that not half that number will become mechanics. The lawyer, the banker, the merchant, and the farmer who had graduated from a manual training school, may sometimes interfere with the business of the carpenter, plumber, blacksmith, etc., by being handy with the tools they have learned to use in school, in doing odd jobs about the house, the store, or the farm. Under the new dispensation we may expect to see the lawyer, doctor, or clergyman, with coat off and shirt sleeves tucked up, beads of sweat rolling down his face, using hammer, saw, and plane as deftly as a mechanic. In this direction manual training may to some extent militate against the interest of the mechanic.

MANUAL SCHOOL GRADUATES COMPARED WITH MECHANICS FROM ABROAD.

Compare the probable number of future mechanics graduating from a school of one hundred pupils with the probable increase in mechanics by immigration, as drawn from figures given in a previous part of this report. The result will show that if we had a score of colleges in this State like the Cogswell Polytechnic College, the skilled labor market would not be so seriously affected by the addition to its number yearly as it is by the tide of immigration from Europe, should it continue to flow in at the rate it has in the past. (See the figures given elsewhere.)

CHAPTER II.

MANUAL TRAINING SCHOOLS.

The Leland Stanford, Jr., University.

The new university, in course of erection at Palo Alto, founded by Senator Stanford, is to give a practical as well as a classical education.

If the ideas of the founder are realized, it will be the most unique and useful institution, as it is one of the most liberally endowed in the world.

The vastness in conception and magnificence in endowment of this institution are almost without precedent in the history of nations. In round numbers about \$20,000,000 is the estimated value of the endowment. It will be a training school for the physical as well as the intellectual youth. It will be the grand center of the practical man as well as of the cultured in California.

From the manual labor departments of the university are expected the earliest and most practical benefits of this magnificent enterprise.

"I intend," said the founder, "that the Stanford University shall not only give one a classical education, but that under its roof one may learn telegraphy, type setting, type writing, journalism, bookkeeping, farming, civil engineering, etc. For a number of years prior to its inception, young men, graduates of Harvard, Yale, and other eastern colleges, used to call on me, bearing letters of introduction, and asking me to find employment for them. I would learn, on examination, that while their knowledge of Greek and Latin, logic and metaphysics, might be thorough, they were actually helpless so far as practical knowledge went. They were willing to learn, it is true, but the world is full of unskilled labor, and so I was forced to put them on the railroad as conductors, brakemen, and firemen, in order that they might become self-supporting. I then conceived the idea of a university from which young men could graduate fully equipped for the battle of life in whatever direction their taste might run."

The benefits of the university are not to be confined to boys alone; they are to be equally extended to girls. It will be a university on the co-educational plan, and it is not intended that the girls shall be confined in their study to books or to drawing and painting. Senator and Mrs. Stanford are of the opinion that there are very many useful mechanical arts which girls can learn, and by the use of which they can make comfortable livelihoods. There will be a school, for instance, to teach the girls at the university cookery. There will be masters to instruct them in designing patterns for wall paper and fabrics; and women can also be engaged profitably in wood carving and many other such mechanical operations. It is the intention to increase as far as possible the number of occupations in which women may profitably and pleasantly engage, and to equip the girls who desire such training for these mechanical industries. Keeping in mind that the main idea of the university is to be useful to the great mass of the people, the founders purpose that students who desire it shall be instructed in the mechanical and useful arts. It is intended to prepare boys for the workshop as well as for the professions, and all the mechanical arts, so far as possible, will be taught by most skillful masters. This branch of the university will also afford the students an opportunity to defray a portion of their expenses. Machinery will be in operation; work will be done which will be sold in the public markets; and in this way the students who are engaged in this department will be enabled to earn a substantial sum of money. For instance, it is proposed that cabinet making shall be taught in the university in a practical manner; furniture of artistic designs will be constructed, and the students while learning this business will be apprentices. The product of the labor of the instructors and the students will be sold, or will be used in the dwelling houses on the estate, and those engaged in this labor will be paid for their work. In this practical way the student will be taught his trade. All the other mechanical trades will be taught practically in the same way.

There will be a fruit orchard to plant and cultivate; there will be trees to prune, and fruit to pick and can. In California this is destined to be a great industry, and much technical education will be required to prosecute

it successfully. Some of the students at the university at Palo Alto, who intend to make fruit culture their business in life, will be employed in the orchards on that estate, and they will be paid for their labor, and at the same time become masters, not only of the technical knowledge part of their work, but also of the practical part of their business. There will be a vineyard on the place, and this will have to be planted and tended. Grapes will have to be picked and pressed into wine. Viticulture, too, is destined to be a great industry in California, and many students, undoubtedly, will seek the university to be trained thoroughly in the business of caring for a vineyard and making wine. Students will be employed at so much a day or hour there to do the manual work in the vineyards, and be thus enabled to at least partially defray by their own work their expenses at the university.

MANUAL TRAINING IN SAN FRANCISCO—THE COGSWELL POLYTECHNIC COLLEGE.

The Cogswell Polytechnic College, situated on Twenty-sixth and Folsom Streets, San Francisco, was opened for the reception of students on Monday, August 6, 1888. It is the first school for manual training established west of the Rocky Mountains, and marks a new era in the history of San Francisco. The brief history of California, as a State among a noble sisterhood of States, shows much that is great and praiseworthy, but the record of the act of Doctor Cogswell in founding this most useful institution will be one of the brightest pages in it. The youth of the State have reason to be especially grateful to this public benefactor, for he has opened avenues for future usefulness hitherto closed to them.

The fact is well established that when a Californian undertakes to do something good, he does it in no half-hearted or small way, and the princely benefaction of \$1,000,000 for this college proves that Doctor Cogswell has maintained the reputation of his adopted State.

The college building is large, beautiful and most attractive in design and finish, and, in every particular, well adapted for the purpose for which it was constructed. It is claimed for it, by those who ought to know, that it is the most perfect of its kind, in all its structural arrangements, in the United States.

The Superintendent, Mr. James G. Kennedy, thus described the aims and objects of the college:

The theory on which the school is based is that education should correspond to the spirit of the people. That is, in an agricultural district it should be agricultural; in manufacturing and commercial districts it should pertain to manufacturing and to commerce, so that when a boy goes out he may have not only something to do, but be recognized as a superior workman, having intelligence outside of his practical knowledge of the use of tools. For boys we have, first, a wood laboratory, where they will learn to make all kinds of joints and everything else a carpenter can learn; second, is an iron shop; third, a forging shop; fourth, a foundry; fifth, assaying laboratory.

The girl learns, first, clay modeling—the basis for all kinds of modeling of brackets, chandeliers, etc.; second is drawing; third, designing; fourth, china painting; fifth, *repousse* work—hammering out brass, gold, silver, and copper work; sixth, wood carving; seventh, plain and ornamental sewing. Cooking may come later, but thus far no provision has been made for it. That is merely an outline of the manual work.

Of course while the pupils are pursuing their course in handicraft they are also learning English, and either Latin, French, German, or Spanish, applied mathematics, etc. We will teach on the principle that it does not take a boy as long to learn the principles of physics and chemistry while working at the bench, as it does to teach him the theory without the practice. We will waste no time on the study of English, but we will study English spelling, grammar, and rhetoric daily with our history or other subjects.

It is my hobby that those branches which we use every time we read or talk or write should be inseparably interwoven into all other studies. It will be the teaching of the future. In future there will be no such thing as a separate hour devoted to spelling, one to grammar, one to composition, but all will come in with the study of history or any other

branches wherein are to be found words and ideas new to the pupils. These boys will go hence with more sound practical English, grammar, higher mathematics, chemistry, physics (besides a trade they can follow) than any boy graduated from the San Francisco High School. Mind you, I don't say that when they begin they will be as rapid workmen as those who have devoted all their lives to work and work only. But after a little practice they will not only become as rapid in the accomplishment of their work, but will be more valuable employes, from their knowledge of the relationship their special work bears to other work in the shop. They will be superior in many other ways. I have spoken to leading founders and builders and they encourage me by promising to give the graduates of the college a fair trial after graduation. That is all I shall ask. I know that with but few exceptions the graduates of the Cogswell Polytechnical College will be acceptable in any industry they are taught.

The following particulars descriptive of the building are taken from the San Francisco "Daily Report:"

The college buildings are on the southeast corner of Twenty-sixth and Folsom Streets, and the main building faces Twenty-sixth Street. The lot fronts two hundred and forty-five feet on Folsom and one hundred and eighty-two feet on Twenty-sixth. The building is three stories in height, and from its imposing and substantial appearance is the most notable structure in the southwestern portion of the city. It is seventy-one feet in width by eighty-five feet in depth, not including the projections. On each side is a wing two stories in height, each thirty-five by forty feet. The building is surmounted with a metal roof with handsome cresting on the ridges. In front a high tower rises to the height of one hundred and twenty-seven feet, the apex topped with a revolving crystal star set in a copper pinnacle. On the face of the tower, above the third-story line, is the dial of a clock, and still lower down the name of the college. The main entrance is spacious and surrounded with a wide porch. On each side of the door is a niche for the placing of pieces of statuary. There are also two side entrances, one for boys and the other for girls. The main entrance porch is approached by a broad flight of stone steps. The main hallway is ten feet in width, and it opens into a cross-hallway twelve feet wide, which crosses the building from end to end. From the cross-hall stairways lead to the second story; stairs also lead to the stage at the rear and to the front of the assembly hall in the story above. It will thus be seen that the means of egress are unusually excellent, there being three wide doorways from the ground floor to the street, and two from the second story to the assembly hall. There are to be ten class rooms, each twenty-eight by thirty feet; four to be on the main floor and the other six to be in the second story. Two class rooms are already ready. On the first floor also, are the offices of the President and Secretary, a reception parlor, a library sixteen by twenty-eight feet, and a museum twenty by twenty-eight feet, besides a number of dressing and toilet rooms. A spacious assembly hall occupies the entire third story. It is sixty-eight by seventy feet in size, and will have a seating capacity for one thousand. It will be used for the delivery of scientific and other lectures in connection with the regular courses of study in the school. This hall will eventually be handsomely furnished and provided with a stage, with all the necessary adjuncts for completeness. All the rooms are well lighted, and every appliance known to modern skill is introduced to make ventilation perfect. They are lighted with electricity, and electric bells and speaking tubes are run throughout the structure.

A short distance in the rear of the main edifice is another building, in which the shops and laboratories are fitted up. It faces the north and is one hundred and fifty-two feet in length by forty feet wide and two stories in height. The ground floor is devoted exclusively to iron work, both designing and molding; having departments for filing, fitting, and chipping. A laboratory is established in a room thirty-five by forty feet and fitted with all the essentials for thorough instruction in polishing, fitting, and setting up of various pieces and descriptions of machinery. A machine tool laboratory is forty by forty feet in size and completely equipped with iron lathes, a drill-press, planers, and rollers, by the aid of which pupils will be instructed in the arts of turning, drilling, and planing iron, so that they will be qualified to construct tools and small pieces of machinery. A forging furnace and laboratory has also been established and occupy a space forty by forty feet. The founding laboratory will be thirty-five by forty feet in size, and contain a smelting furnace and other necessary appliances.

The second floor will be devoted to the chemical, wood, and physical departments. The carpentry department is forty by thirty-five feet, and supplied with an extensive assortment of tools. A wood-turning factory is forty by forty feet, and supplied with lathes, a planer, a circular saw, a band saw, a mortise machine, a molder, and several other machines. The remaining space on the floor will be at the disposal of the physical and chemical departments. One room, twenty by twenty feet in size, is fitted up with shelving inclosed in a glass front, where all the philosophical apparatus will be kept that is used in experiments in chemistry and physical instruction. The furnaces in connection with this department are in an adjoining room, forty by fifty feet in size.

The department for instruction of girls will be fully as complete in detail as that for the boys. Here instruction will be given in wood and metal carving, sewing, cutting, and fitting, as well as other mechanical studies. In the basement are well lighted lunch rooms for the boys and girls; also rooms for the janitors and others who will reside permanently on the premises. There is also some additional space which may be utilized for class

rooms or shops that may hereafter be required or found desirable. All the departments of machinery will receive motive power from a seventy-five horse-power horizontal engine, which, together with the boilers, will be of the most approved pattern.

For the maintenance of the institution Doctor Cogswell and his wife, on March 24, 1887, executed a deed of trust for about \$1,000,000 worth of real estate, the income from which is expected in time to defray all the current expenses of the college.

The trust deeds declare the object of college is to give the boys and girls of the State of California a practical training in the mechanical arts and other industries. There are seven Trustees appointed to carry out the designs of the founder.

One important provision, which the philanthropist made, was that the Trustees should account to the Mayor of San Francisco, "if such accounting be required by him."

Prospectus of Cogswell College.

The college is not designed to teach trades, but to fully prepare the student to enter successfully upon any line of work. The aim is to fully develop the boy and the girl mentally, morally, and physically, thereby producing self-reliant and self-helpful men and women.

This college affords students an opportunity to continue their literary, scientific, and mathematical studies, and at the same time to receive a thorough training in the industrial arts.

At present only one hundred students, or the first class, will be admitted. Each succeeding year pupils will be admitted into the classes, to take the places of those promoted.

Applicants for admission to the Cogswell Polytechnic College must be at least fourteen years of age, and pass an examination in the rudiments of English, arithmetic, geography, and history of the United States. Pupils paying tuition will be admitted upon presentation of a certificate of graduation from a grammar school.

The tuition fees will be \$100 per year, payable semi-annually, in advance.

In connection with the college there will be a preparatory department, for the purpose of affording a special preparation for the regular work of the college.

Students, to enter this department, must be at least twelve years of age, and be able to pass an examination on the work of the third grade grammar classes.

The tuition in the preparatory department will be \$36 per year, payable semi-annually, in advance. Other conditions will be the same as for entering the regular college course.

Students must furnish their text-books, overalls, aprons, etc. The college furnishes all materials and tools.

Loss or breakage, resulting from carelessness, will be charged to the student responsible for the same.

The necessary books will cost from \$10 to \$12 per year.

Students are not boarded at the college, but the faculty will take charge of pupils from abroad, when requested. Boarding and lodging can be had in private families for from \$5 to \$8 per week.

On the basis of 25 per cent, the admission of one hundred students will give twenty-five free scholarships, to be contested for in the competitive examination, which will take place in July next. These scholarships can be contested for by boys and girls alike.

When the college is fully equipped there will be eight laboratories—one for wood, four for metals, one for physics, and one for chemistry. They will be furnished with the best of tools and apparatus, and will be large enough to accommodate from twenty-five to fifty students each. These laboratories will be fully equipped as they are needed.

The college, when completed, will accommodate four hundred students. Of these, one hundred will hold free scholarships. The percentage of free scholarships will be increased as rapidly as the condition on the trust will warrant.

Two hours and thirty minutes of each day is devoted to industrial art. The school day begins at 9 A. M., and closes at 3 P. M., thirty minutes being allowed for the noon intermission. Each student, besides the industrial work, will have three recitations per day.

MANUAL TRAINING IN OAKLAND.

In 1884 a class for manual training was organized in the Lincoln Grammar School of Oakland by the Principal, T. O. Crawford. He had to depend on rather scanty resources for the supply of necessary materials and for the construction of a workshop, benches, etc. Hence it was started in a small way, but so devoted was the Principal to his work, that it proved a success, and has continued in operation since. Forty-three pupils have been registered for the current term of 1888-89.

The manual training class is divided into two parts, being classified according to the knowledge the pupil possesses of the use of tools, etc. The course is so arranged as not to interfere with their regular school studies. One half day during the week, from 8 A. M. to 12 P. M., is devoted to teaching the use of carpenters' tools, and another half day to instruction in mechanical drawing.

Pupils are allowed the use of the workshop after school hours. The workshop is a well arranged and lighted one-story frame building, erected in the school yard. It is furnished with twenty benches and forty sets of tools. One end of this building is partitioned off and used as a draughting room, wherein pupils are first required to draw scale drawings before being permitted to work on making any article.

The Principal of the school, Mr. J. N. McClymonds, says that "after a trial of manual training for more than four years, the experiment has proved highly satisfactory."

The success attending manual training in this school during the past four years has been so gratifying that the Board of Education authorized the establishment of a similar school in connection with the Franklin Grammar School of Oakland.

CHICAGO MANUAL TRAINING SCHOOL.

The Chicago Manual Training School is in a beautiful building and is admirably equipped. It was opened in January, 1884. There are over two hundred scholars in attendance. The Director, Dr. H. H. Belfield, says: "I am confident that three years of a manual training school will give at least as much purely intellectual growth as three years of the ordinary high school, because every school hour, whether in the class room, the drawing room, or the shop, is an hour devoted to intellectual training."

ST. LOUIS MANUAL TRAINING SCHOOL.

The St. Louis Manual Training School carried off honors and rewards at the Educators National Convention in San Francisco. This is not a free institution. It is a pay school attached to the Washington University.

Great success has attended it from its foundation, under the able superintendence of its Director, Professor C. M. Woodward. The ordinance establishing the manual training school was adopted by the Board of Directors of the University, June 6, 1879. On September 6, 1880, the school opened with a single class of about fifty pupils. The whole number enrolled during the first year was sixty-seven. A public exhibition of drawing and shop work was given June 16, 1881. The second year of the school opened September 12, 1881, and closed June 14, 1883, with the graduation of its class. Twenty-nine young men received diplomas and medals. The enrollment of the year was one hundred and seventy-six. The enrollment for the fourth year was two hundred and one. Twenty-nine students received diplomas June, 1884. The enrollment of the fifth year was two hundred and eighteen. The number of the graduating class in June, 1885, was thirty-nine. The enrollment of the sixth year was two hundred and thirty-three. The graduating class numbered forty-five. The enrollment of the seventh year was two hundred and twenty-six. The graduating class numbered fifty-two.

The following are the tuition fees charged: First year class, \$30 per term, or \$60 per year; second year class, \$40 per term, or \$80 per year; third year class, \$50 per term, or \$100 per year.

The time spent in shop work has never exceeded two hours per day, unless the boys have voluntarily remained after hours; that is, after 3:30 o'clock, for additional practice. Moreover, from these two hours should be subtracted fully ten minutes for washing, dressing, etc. A week, therefore, represents about nine hours of actual work in a shop. Hence, in placing a value upon the time spent, it should be remembered that a "day's work" is all the boys have per week.

The school is now in its eighth year. From the start it has been well patronized, and the enrollment shows a steady increase. Five classes have graduated from the school. About one half of those who attend the school remain to graduate.

BALTIMORE MANUAL TRAINING SCHOOL.

Baltimore has the honor of being the first city of the United States to establish a manual training school in connection with her public school system.

In October, 1883, the City Council of Baltimore passed an ordinance authorizing the Board of Commissioners of Public Schools of that city to establish a school for manual training. In January, 1884, the General Assembly of Maryland passed an Act empowering the Mayor and City Council of Baltimore "to establish in said city a system of free schools, which shall include a school, or schools, for manual or industrial training." This was necessary, as the old law did not authorize them to do so.

The school was opened March 3, 1884, with sixty students.

The most convincing evidence of the success which has attended this innovation into the public system of Baltimore is the remarkable growth in the number of scholars: Students on roll March, 1884, 62; June 30, 1884, 100; December 31, 1884, 147; June 30, 1885, 112; December 31, 1885, 94;

June 30, 1886, 110; December 31, 1886, 150; December 31, 1887, 273; June, 1888, 350.

Candidates for admission must be at least fourteen years of age, and must pass a satisfactory examination in reading, spelling, writing, arithmetic, geography, and English composition. No fee is charged for the use of tools, materials, and books to the scholars of Baltimore.

BOSTON MANUAL TRAINING SCHOOL.

The Industrial School Association of Boston organized an evening class of thirty-two boys in wood carving, in April, 1884. Their ages ranged from twelve to sixteen. The tools used were three in number: the flat chisel, the gouge, and a veining tool. Blocks of white wood, six inches long, three inches wide, and one and one half inches thick, were the material acted upon. Each boy had a place at a bench, and each had a vice with wooden jaws and an iron screw.

The success of this experiment was so great that the association decided to adopt for their second experiment a course of instruction in the use of common wood working hand tools.

Two hundred boys from ten different grammar schools received instruction two hours per week.

The Superintendent of Schools in his report says: "The interest in their work shown by the boys is very lively, such as I have seldom seen surpassed in any kind of school work. Many boys came to the shop afternoons an hour before the appointed time and got the teachers' permission to work three hours instead of two.

"The experiment has already gone far enough to prove that work of this kind can be joined to the ordinary grammar school work with good effect. But, it may be asked, where is the time for this new branch of instruction? It would be wiser to make room for manual training by dropping some of the old studies. For example, if the question were between physics, as commonly taught out of a book, on the one hand, and the instruction in carpentry on the other, I should unhesitatingly prefer the latter."

PHILADELPHIA MANUAL TRAINING SCHOOL.

The Board of Education of Philadelphia, in September, 1885, opened the City Manual Training School, which is connected with the public school system of that city. The school circular says that the school is intended for boys who had finished the twelfth grade of the grammar school course. The manual training is intended to give the boys such a knowledge of the tools and materials employed in the chief industrial pursuits of our times as shall place them in more direct and sympathetic relations with the great activities of the business world.

An industrial exhibition of the public schools of Philadelphia was held at Horticultural Hall, in that city, on May 28, 1888. A newspaper thus refers to it:

Besides the special departments in the public school this is a separate institution devoted entirely to manual training with a course of three years. Girls are taught needle-work, drawing, clay modeling, costume making, etc., and on the opening of the exhibition there were two hundred ladies from the Normal School, who illustrated the work that had been done from the modest beginning to the artistic perfection.

The girls went through all the mysteries of the kitchen, while not far away was a kindergarten class, where little girls were being taught to sew, hem, and stitch, while classes from the Industrial Art School carved wood and modeled clay with surprising deftness and skill. The boys from the Manual Training School hammered on anvils, ran lathes, experimented with electricity and chemicals, and went through other interesting exercises.

GIRARD COLLEGE.

In the Girard College, Philadelphia, the authorities of that celebrated institution have introduced a mechanical course including drawing, the use of tools, and such other elementary training as will lay the foundation for proficiency in the mechanical arts. About three hundred boys are now receiving instruction.

In the report of 1886 the Directors say in reference to the success attending the manual training department:

The experiment, begun in 1882, was so gratifying that, after an experience of little more than a year, it was determined to increase the number of branches. In December, 1884, teaching the use of tools on wood work was introduced; since then a smith shop and foundry. Mechanical and geometrical drawing are now taught.

We believe that all of these are necessary to equip a lad to go out from the college and take his place among the young mechanics of our country. While each study is taught to every pupil old enough to handle tools, careful supervision soon discovers the branch in which he seems to display most capacity. To this, after having gone through the curriculum, he is allowed to devote himself.

During 1884 metal work alone was taught. During that year only about one third of the boys who left college entered into mechanical pursuits; of those who left in 1885 two thirds have obtained work in mechanical occupations.

No less than thirty of our boys were received into first class mechanical establishments, where, instead of having to learn the most rudimentary branches, they are at once recognized as useful workmen and paid accordingly.

MANUAL TRAINING SCHOOLS PROJECTED.

Appreciating the importance of expressions of public opinion on the subject of manual training, the following excerpts will show what is being said and done in other States of the Union where schools are about to be established:

Albany, New York.

The subjoined is taken from the report of a special committee appointed to investigate and report as to the advisability of introducing manual training into the public schools of Albany, New York. It was presented to the Board of Public Instruction on October 3, 1887:

Resolved, That it is expedient and advisable that manual training be added as a part of the course of instruction in our public schools.

Resolved, That for the purpose of giving the new system a fair trial, in the most economical manner possible, one of the rooms in the basement of the high school building be fitted up as a wood-working shop; that a competent instructor be employed to teach the boys in attendance at the high school in the proper use of wood-working tools for a period of one year, the total cost not exceeding \$1,500.

St. Paul, Minnesota.

The following extracts are taken from a report of a special committee, which was adopted by the Board of Education of St. Paul, Minnesota, February 6, 1888:

We recognize the importance of carrying forward manual training simultaneously with all other educational processes, but provide suitable training for different grades, reserving shop work and the use of wood and machine tools for pupils who have completed or nearly completed the grammar school course.

In accordance with the ideal thus presented there would be no necessity of large expenditures. The present facilities, with those that will be furnished by the addition to the high school, now in course of erection, will answer for the present, and the ideal manual training school will be a natural growth and development of the work now in progress, if it be properly fostered. We recommend that this committee be authorized to prepare and submit a course of study covering a period of three years, to include the studies of English, mathematics, science, drawing, and shop work. That at the end of the present school year, pupils, who have finished the work of the grammar schools, may be admitted to either the high school or the manual training school. That the manual training school for the present be located in the basement of the high school building, its pupils reciting in English, mathematics, and science, in the same classes and to the same teachers as the pupils of the high school.

City of New York.

In the City of New York important steps have lately been taken in the direction of introducing manual training into the public school system. The Board of Education, after long and patient deliberation, adopted a series of resolutions which, while they did not call for the introduction of manual training at once in all the schools, authorized its experimental introduction in six schools for boys and six schools for girls. For this purpose \$15,000 has been appropriated. The sum is so small that one cannot fairly treat the results obtained from its expenditure as deciding the success or failure of manual training.

For the introduction of this branch of instruction in sixty public schools, for procuring the necessary materials and tools, for cooking departments, for alterations to buildings, and for teachers' salaries, the cost would be for the first year, \$128,500, and for each succeeding year, \$90,000. With the small sum now available, only three special teachers can be employed, and a beginning made in twelve schools.

If the workshop and cooking schools be adopted in only one third of the grammar schools, the cost of maintenance for the first year would be \$54,500, and the expenses during the succeeding years of maintaining manual training, including the workshop and the cooking school in one third of the grammar schools, would be \$41,500. The committee recommends that these types of manual labor should be introduced: Carpenter work, or the use of the wood-working tools for boys; modeling in clay for boys and girls; construction work in paper, pasteboard, and other suitable material, for boys and girls; drawing for boys and girls; sewing for girls, and cooking for girls. It would probably not be possible the first year to introduce the kitchen and workshop into more than one third of the grammar school departments.

Detroit, Michigan.

On February 23, 1888, the Detroit, Michigan, Board of Education received the following report of the Special Committee on Manual Training through Inspector O'Flynn:

Your committee, therefore, earnestly recommend the establishment of such a school, which may be termed the Mechanics' High School. For the first year the current expense will not exceed \$10,000.

Your committee recommend that at first so much of the building be erected as will be sufficient for the study and recitation rooms required for the school when completed, and shops for the first year's class. The following year the balance of the building, which will be required for shops for the remaining classes, can be erected. The cost of the site, building, and equipment for the first year will be \$60,000, distributed as follows: Building, \$23,000; site, \$25,000; the equipment of four work rooms, for cooking, sewing, drawing, and carpentry, \$3,000; equipment of study and recitation rooms for four hundred pupils, \$2,400; contingencies, \$6,000. The addition to be made to the building in the second year will cost \$23,000, and the shops required for the second, third, and fourth years can be fitted up for \$1,500 apiece. These figures are reliable, as they have been obtained from the Superintendent of the Toledo Training School.

Somerville, Massachusetts.

The following report was submitted to the School Committee of Somerville, Massachusetts, on May 28, 1888:

In view of all the work seen and information gathered, your committee are convinced that the establishment of manual training as a feature of the Somerville schools is practical and expedient, being an essential part of a complete educational system, and they respectfully recommend that the school committee inquire further into the subject, and take into consideration the advisability of inaugurating such features of the system as can be introduced, such as are fundamental in a manual training course.

CHAPTER III.

TECHNICAL INSTRUCTION AND TRADE SCHOOLS.

During the past decade hundreds of technical and trade schools have been established throughout Europe. Russia led the way more than a hundred years ago in introducing the method of class instruction in the use of tools. Their effect upon the manufacturing industries of the people has been most remarkable, and great rivalry exists among the several nations as to which shall excel in the number and efficiency of these schools. Generally speaking, they have been established and are supported by government aid, for the education of children of laboring classes. In some localities they have been established to foster certain industries. In France there are schools for tapestry, silk, and laces; in Belgium, for weaving; in Switzerland, for watches and toys; in Bohemia, for glass making and pottery; in Russia, for machinery and leather, and so on.

Ten years ago Austria had twenty-eight schools for instruction in weaving; three for lace; fifteen for wood, marble, and ivory; six for toys; four for baskets and mats; eight for miscellaneous branches.

We have very few such schools in the United States. The pinch of necessity has not yet been felt to compel any State to establish them, and they are not likely to be so as long as the well trained of foreign lands come to our shores to better their condition. With very few exceptions, the industrial and trade schools in this country are of a charitable or benevolent character, and supported by voluntary contributions. Some for the benefit of Indians are supported by the Government.

The following table shows the number, etc., of such schools, as given by the United States Bureau of Education:

TABLE H H.

Statistics of Schools giving Industrial Training in Various Forms for 1885-86, etc.

No.	NAME.	INDUSTRIES TAUGHT.
1	Industrial department, Talladega College.	Sewing, farming, use of tools in carpentry, blacksmithing, printing, and housework.
2	Adeline Smith Industrial Home.....	Housework, needlework, and cooking.
3	Fort Stevenson Industrial School.....	General farmwork, carpentry, shoe and harness making, and housework.
4	Dakota Indian Industrial School.....	Farming, gardening, and carpentering.
5	Industrial department, Clark University.....	Carriage and wagon work, harnessmaking, printing, sewing, carpentry.
6	Haven Industrial Home School.....	
7	Connecticut Industrial School.....	Sewing and cooking.
8	Railroad Mission Industrial School.....	Sewing.
9	St. Mary's Training School.....	Farming, shoemaking, tailoring, carpentering, blacksmithing, etc.
10	Busy Bee	Sewing, knitting, and fancy work with needle.
11	White's Indiana Manual Labor Institute.....	Farming, housekeeping, carpentering, blacksmithing, harness and shoe making.
12	Levering Mission Manual Labor School.....	Agriculture and various household work.
13	White's Iowa Manual Labor Institute.....	Work necessary on a grain and stock farm, carpentering, household work, and sewing.
14	Chilocco Indian Industrial School.....	Blacksmithing, shoemaking, laundry work, carpentry, general house and farm work.
15	Haskell Institute, school for Indians.....	Shoemaking, blacksmithing, carpentry, farming, and miscellaneous domestic.
16	Maine Industrial School for Girls.....	Sewing, cooking, and housekeeping.

TABLE H H—Continued.

No.	NAME.	INDUSTRIES TAUGHT.
17	St. Mary's Industrial School for Boys.....	Printing, tailoring, shoemaking, cigar-making, farming, cooking, carpentering, painting, pipe fitting, and engineering.
18	Industrial School for Girls.....	Housework, sewing, knitting, and dressmaking.
19	Industrial Schools (2), (Boston, North End Mission).....	Sewing and kitchen work.
20	Vacation Industrial School.....	Carpentry and joinery.
21	South End Industrial School.....	Printing, sewing, cooking, drawing and designing, carpentry, and kitchen gardening.
22	Children's Home Training School for Girls.....	Housework and sewing.
23	Industrial School for Girls of the Lansing Industrial Aid Society.....	Plain sewing and housework.
24	Mississippi Industrial Institute and College.....	Dressmaking, wood carving, cooking, printing, etc.
25	The Southern Christian Institute of Mississippi.....	Farming or agriculture.
26	Industrial School, St. Joseph's Convent.....	Sewing, cooking, washing, and ironing.
27	St. Ignatius Mission School.....	Carpentry, blacksmithing, harnessmaking, printing, tailoring, general housework, sewing, washing, cooking, etc.
28	Genoa Indian Training School.....	Farming, harness and shoemaking, carpentering, sewing, tailoring, and housework.
29	Romona Indian industrial department of University of New Mexico.....	Gardening, carpentry, shoemaking, painting, sewing, cooking, and general housework.
30	Industrial Schools (Children's Friend Society).....	Housework, sewing, cooking, and gardening.
31	Brooklyn Industrial School Association, and Home for Destitute Children.....	Sewing, cooking, all household duties, and carpentry.
32	Eastern District Industrial School.....	Sewing, darning, and mending.
33	St. Paul's Industrial School.....	Machine and hand-sewing, dressmaking, and housework.
34	Five Points House of Industry.....	Type setting, housework, cooking, and sewing.
35	Industrial Schools (12) of the American Female Guardian Society.....	Sewing, drawing, kitchen gardening, and cooking.
36	Industrial School of St. Augustine's Chapel.....	Hand and machine sewing, embroidery, worsted work, cutting and fitting.
37	Industrial School of the United Hebrew Charities.....	Sewing and embroidery.
38	Wilson Industrial School for Girls (and Mission).....	Sewing and household work.
39	The Industrial School of Rochester.....	Chair seating, cooking, sewing, and domestic work.
40	Industrial School of the Sisters of Mercy.....	Laundry work, housework, and sewing in all of its different branches.
41	Industrial School and Home (Children's Aid Society).....	General farm work, etc.
42	Training School for Indian Youth.....	Blacksmithing and wagon making, carpentering, tailoring, shoemaking, tinning, harnessmaking, painting, printing, farming, cooking, and sewing.
43	Indian Industrial Training School.....	Shoemaking, tailoring, blacksmithing, carpentering, farming, and gardening.
44	Friends West District Colored School.....	Sewing to the girls.
45	St. James Industrial School for Girls.....	Washing, cooking, baking, sweeping, etc.
46	Simpson Industrial Home.....	Domestic economy and sewing.
47	Slater Training School.....	Sewing, cooking, housekeeping, and carpentry.
48	Good Shepherd Industrial School.....	Plain sewing, dressmaking, fancy work, and housekeeping.

TECHNICAL EDUCATION IN ENGLAND.

For the benefit of those who predict that the labor market is likely to be flooded with incompetent workmen in the event of manual training and technical schools being extensively established, it is well to cite the opinions of those who have had practical experience in the matter.

In Great Britain there are a very large number of technical schools, which have been in operation many years. The good or evil results flowing from them ought now to be apparent, and mechanics, especially, should know whether or not they are prejudicial to their interests.

The British Trades Unions Congress, held at Hull, England, September, 1886, presented a report, from which the following extract, relating to technical schools, is taken:

If a certain section of politicians would devote their time to advocating the establishment of technical schools for teaching the sons of our people those subjects which have to do directly with their various trades, instead of denouncing the foreigner and setting people against each other, they would do far more service to the State. We have no greater friend than knowledge, and no more bitter enemy than ignorance. In order to hold our own with the nations of the world we must have the same facilities to obtain for our children and young men both elementary and technical knowledge.

There are two sides at least to every question. If the mechanic has one regarding the utility of technical teaching at school, the boy, whom it also concerns as deeply, has another. If it affects the prosperity of the mechanic on the one hand, it is a matter of bread and butter and of future support on the other.

HOW BOYS ARE TO LEARN TRADES.

Take then, a view of the situation from the standpoint of a boy who feels that he has a taste or desire to become a mechanic. How can he become one? The answer is easy. Let him go to an employer or master mechanic as an apprentice. That is very easy to say, but not so easy to be done, especially in the case of a boy whose father is not a mechanic. In the first place, the trades unions rules limiting the number of apprentices is a serious obstacle in his path. I know of my own knowledge of a boy, a most excellent boy, who, after spending some months in a shop in San Francisco, had to leave because there were already too many apprentices in the shop. The limit to the number of apprentices set by the said trade is undoubtedly moderate, and to any one who believes in the right of craftsmen to protect their interests by conservative rules, their action in the matter must appear justifiable.

But what is to become of the boy? His father was not a mechanic and did not belong to any trades union. The boy wished to learn a particular trade, and he found the way blocked. There are a great many boys like him roaming the streets to-day. There are hundreds, aye, thousands of boys from fourteen to seventeen years of age living in an aimless, shiftless manner, who attend school irregularly, and go there because they have nothing else to do, and profit very little by what they are taught because their heart is not in the work. Why? Because they lack a motive, an impulse of action. These boys would be at a trade if they only knew the way to get there. If tools were put in their hands and some one placed over them to teach them how to use the tools, these same shiftless, aimless boys, who before seemed good for nothing, would brighten up and work with a vim.

It is not the fault of most boys if they mispend their time in idleness or worse, but the fault of the conditions under which they live.

Michael Davitt spoke the truth when he said, "A boy must commit a crime before an opportunity is afforded him by the State to learn a trade." In a few instances boys have actually done so deliberately for the purpose of being sent to some prison where trades are taught. Here is a striking instance taken from a California newspaper:

A STRANGE CRIME—A MAN COMMITTED ARSON TO LEARN A TRADE IN SAN QUENTIN.

A young man named John O'Brien accosted Police Officer Williams yesterday afternoon, and said he wished to give himself into custody for arson. He said he had burned about seventy-five ties at the Peralto Yards in West Oakland. Investigation revealed the truth of his assertion, and he was locked up for safe keeping. He could offer no explanation for his strange act in giving himself up, stoutly declaring that the arson had been committed with malice and forethought. He said "*he had never learned a trade, and if he went to San Quentin that defect might be remedied.*"

Less than a year ago three Chicago newsboys were arrested at their own request, and brought before a Justice, to whom they said they wanted to be sent to Bridewell. When asked the reason why by the Judge, one of the boys, who seemed to be the leader, spoke as follows:

Well, yer see, I went out dare in der winter time. De coppers pinched me for cracking a dago stand. Dey showed me how to make chairs, an' dey gave me better grub dan I can get here. I was let go an' didn't get tru learnin' de trade, an' I want ter go back so I can make a livin' some way besides shinin' or sellin' papers. Dese yer fellers want ter learn de trade, too, so dat's why we wants ter go out.

This necessity for supplying a boy who wishes to become a mechanic a means to do so, the Master Builders of the United States have taken the initiatory steps to remedy, so far as the trades in their line are concerned. At their Convention held in Cincinnati, February, 1888, it was resolved to establish trade schools which would resemble in character the Auchmuty Trade School of New York.

The members of the National Association of Master Builders in Philadelphia have already taken steps to establish such a trade school in that city, which has already set an example in manual and technical training combined with other education.

THE AUCHMUTY TRADE SCHOOL, NEW YORK.

The Auchmuty Trade School referred to is situated at First Avenue and Sixty-Seventh Street, in the City of New York. Practical instruction is there given in plumbing, plastering, bricklaying, stonecutting, house and sign painting, frescoing, wood carving, carpentry, and blacksmithing.

There are day classes and night classes, so that clerks and others working during the day, who think they can better their condition by learning a trade, can attend at night. The fees range from \$10 to \$35, for a three months course. The school has met with such success that several additions had to be made to its capacity since it was first established.

Several other organizations approve of the course taken by the Master Builders. If encouraged by the labor unions, there is no doubt that the trade school plan will elevate labor by encouraging those who mean to be mechanics to remain at school until well educated. The founder of this school, Colonel Auchmuty, is a gentleman of wealth and position, who takes a practical interest in the welfare of our boys, and at considerable expense is testing what can be done to make them self supporting mechanics. His views on this question are well worth recording:

The trade school system keeps boys out of the workshop, and encourages them to remain at school until well educated, and old enough to know for what sort of work they are suited. When a young man decides what calling he wants to follow, he goes to a trade

school and learns how to work, precisely as the would-be doctor, lawyer, or engineer goes to a professional school. When the trade school course of instruction is finished, and the examination with which it should conclude has been passed, the young mechanic enters the workshop. There is no difficulty in deciding what his wages should be; he is worth what he earns, as there are no back claims to satisfy. When able to do a full day's work, the young man applies for a second examination, which, when passed, entitles him to be recognized as a journeyman. It matters but little how strict this second examination is made, provided the young man is informed for what he must prepare himself. As nothing need be made for sale at a trade school, in no way does the labor of the young man come in unfair competition with that of the journeyman.

Perhaps some of your readers may say that this plan assumes that trades can be taught at a trade school. To those who doubt that such is the fact, I would quote the inscription on Sir Christopher Wren's tomb, in St. Paul's Cathedral, "Circumspice"—look around. Let them examine the work on exhibition at the New York trade schools. Besides examining the work of the plumbing class, let them look at the examination papers the young men were required to fill up, and the diagrams of faulty work they corrected. Let them visit the buildings, the walls of which were built by the young bricklayers, or see what the carpenters, stonecutters, blacksmiths, plasterers, and painters have done. The greater part of the work which, can be shown, was done by young men who had no knowledge of their trade when they came to the schools. Over fifteen hundred young men have attended the New York trade schools, and very many of them have returned, or have written to say it was a fortunate day when they crossed its threshold.

TECHNICAL EDUCATION FOR GIRLS.

A prevailing cause for the low rate of wages paid to women is the want of special training. First class dressmakers, cloakmakers, milliners, and tailoresses are in demand. The great work of the world for women is always crying out for trained women. Look at the signs over the doors and windows of first class dressmaking establishments, and you will generally find foreign names. Americans are few and far between. It may be the fashion, "the thing you know," for a certain class of society ladies to give the cold shoulder to their own countrywomen, and patronize only those with French names. The great majority, however, of Americans would prefer to encourage home talent and industry if the opportunity were afforded them. Industrial training for girls is one of the most important things needed by this generation. The whole force of the country is now put to training women and girls as teachers, and the profession is greatly crowded. We have three Normal Schools in this State for this work, and the cry is still for more.

Almost every girl who has to earn her own living wants to become a teacher, and as there are not enough schools and classes to be distributed around, many of them must fall back upon manual labor for a living, in any branch of which they had no previous preparation at all. What an extensive field of clean, light, well-adapted occupations there are for women if only the opportunity were afforded them for instruction. In this respect we can well afford to learn a lesson from the French people. The making of watches, musical and surgical instruments, and fancy jewelry in France is almost entirely in the hands of women. The Government printing press and the Gobelins tapestry are open to women for instruction, and they are paid wages at the same rates as men. French railway companies pay their female employes the same rates of wages as the male. M. Groult established a cookery school at Paris, at a cost of \$80,000. Hamlin founded a training establishment for female silk weavers in Paris, with two hundred and fifty pupils, and with branches at St. Etienne and Lyons. The movement in France for training women in industrial pursuits was organized some twenty-five years ago, culminating in the organization of a school in the Rue de La Terle for women only. Its curriculum, besides general education, includes commercial training, industrial arts, and practical instruction in dressmaking, millinery, and all sorts of domestic sewing. Definite trades are also taught, such as printing, jewelry, wood

engraving, and drawing. The success of this school was phenomenal. Young women taught there were eagerly sought for by employers in many parts of France. Goldsmiths and jewelers established schools where women were successfully trained in the very highest branches of the work. There is a school in Paris for women who are taught clock and watchmaking. Another, where the manufacture of metals is taught. In the manufacture of pianos, harps, surgical instruments and bandages, no less than 60 per cent of the work in France is done by women especially trained for it.

In Germany schools of domestic economy for girls take precedence of most other lines of industrial education. The finest are at Baden and at Wurtemberg. Here all domestic arts are taught. In 1883 the model school of Radolfzell was started. In it girls are taught housekeeping in the most thorough manner. Male teachers instruct in the bakery, also in butter and cheese making. A male physician is in care of the sick; the other teachers are women. Length of course of instruction, five months. Instruction is free, but lodging must be paid for at the rate of 20 marks for the term.

That cookery should be taught in the public schools, and that it can be, with most satisfactory results, Juliet Corson has been assuring the public for years, and she is beginning to see the fruit of her enthusiastic labors. In several cities instruction in this art has become a regular part of the high school course. Everywhere, Miss Corson says, in a recent article, pupils receive the instruction enthusiastically, boys being quite as apt scholars as girls. A frequent comment during cooking lessons given among working people is one of surprise at the absence of dirt and disorder.

TECHNICAL TRAINING IN SAN FRANCISCO.

An effort was made four years ago to establish a school for teaching boys and girls how to make cigars, but it was not successful. A stockholders' association was formed March 12, 1884, in San Francisco. The capital stock was \$75,000, divided into shares of \$20 each. When the school opened six hundred and ninety boys registered their names, and two hundred and forty-two girls, whose ages ran from twelve to sixteen years. The teachers were paid \$15 per week. Circulars relating to the school were sent to teachers and clergymen in San Francisco, showing its objects and inviting coöperation. There was one teacher for every fifteen pupils. The pupils were to work for three months without pay. There were accommodations in the training school for three hundred pupils. After three months' tuition places in cigar factories were to be given to the pupils. Ninety-four pupils graduated the first three months. Unfortunately, for want of proper management, the school did not succeed. The association lost by the enterprise \$11,750.

The cause for establishing this school was a strike on the part of the Chinese cigarmakers. More than three thousand Chinese struck because they wanted to board themselves, instead of being obliged to board with their own bosses, who were paid 50 cents per week for each Chinaman. What brought about the loss in capital was rent, payment of teachers, and destruction of material. The last was the heaviest item. Pupils would not serve even the three months required at the start, without pay.

A school of this kind would be successful, in the opinion of Mr. Shaefer, the President of the defunct association, if placed under proper control.

CHAPTER IV.

THE KINDERGARTEN.

The kindergarten is the foundation for the manual training school. Ten years ago there was not a single free kindergarten west of the Rocky Mountains. There are now between thirty and forty in San Francisco alone, including those in orphanages, asylums, and day homes. The kindergarten system has also been engrafted on the *primary grades of the public schools of San Francisco*, all the teachers of the primary schools—over one hundred of them—having been trained for the work by the Inspectress of Kindergartens, Miss Annie Stovall, a superior kindergarten trainer. Branching out from San Francisco as a center, this system of education has spread to all parts of the State, and all over the Pacific Coast.

The kindergarten is generally limited to children of from three to seven years of age. There are four agencies employed—songs, gifts, occupations, and games.

The first gift is the ball, then spheres, cubes, and cylinders; then the divided cubes, then the plane, the line, and finally the lintel. There are sticks and rings, peas and beans, long needles and perforated paper, but no books or letters, no pens or writing paper. The occupations are perforating paper, sewing cards, blackboard drawing, weaving paper, folding paper, cutting and pasting paper, building and designing with wooden blocks, bean and pea work, and clay molding. By means of the gifts—*i. e.*, the balls, cubes, etc.—the child gains striking impressions of form, size, number, color, etc., and through them becomes familiar with all objects in the world outside. A ball classifies fruit, a round cylinder is the trunk of trees, or stem of plants, etc.; a cube is the object which a man has made, such as a house of rectangular form, etc. After a child has been given a ball, a sphere, a cube, and a cylinder, he is led into an attempt to make something. Thus he is gradually led, by means of his senses, to think, to act, to do for himself.

Froebel, the founder of the kindergarten, watched every natural instinct of a child and modeled his system of teaching upon them. The children have everything but books, and are taught everything except their letters, and there are no attempts made at reading or writing.

From Springfield, Massachusetts, comes the low benches and tables, paper, slates, and blackboards, which are all ruled in tiny squares, those on the blackboard being an inch each way.

The first occupation is to teach a child how to take little sticks of all colors, from one to five inches in length, and lay them on the table in horizontal and perpendicular lines. The next step teaches him how to draw the same on the slate. The next step, to sew the same design with the wool on bristol board, and finally the same is pricked with pins through stiff paper. This impresses the lines upon the child's memory, and then something more difficult is given him, until he is able to make what are called "inventions" of his own.

Weaving is also an occupation much liked by the children. It is done with slips of prepared paper of two colors, and a long, flat needle. The slips are prepared by one color woven under and over with the other. After a child has advanced far enough to make inventions, some very pretty and difficult things are done with these weaving slips.

Counting, form, size, direction, and to be neat and accurate, are some of the things taught incidentally in these forms of amusement. There are

tiles of wood with holes an inch apart, where designs are picked out with little wooden pegs, piecework done with wires of different length and bits of square cut cork, wire rings, paper cutting and folding, and modeling in molder's clay—a Froebelized method of making mud pies.

With the cubes and bricks all sorts of inventions are possible, but a teacher guides these efforts. Four children are seated at a table, and they are allowed to choose their own leader, and must do whatever he does. As soon as the design is finished they sing a rondo, "I am coming now to see which of the forms best pleases me," and after the inspection they decide among themselves which is the prettiest.

FIRST STEPS IN INDUSTRIAL TRAINING.

The beginning of industrial training is not confined to training the hand and eye alone. From the first the child is led to reconstruct, to recombine with the materials furnished him. After he has followed a dictation from the kindergartner, in which blocks, gaily colored sticks, or bright squares of pasteboard are arranged in a symmetrical design, he is required either to add to the figure according to his own fancy, to take it carefully apart and construct it again, or to construct an entirely new figure from the same materials.

After he has been in the kindergarten a sufficiently long time, his greatest delight is to "invent," to make new combinations and designs. Practical men who have looked carefully at these inventions of kindergarten children have often said that many of them would do admirably for designs in wall paper, tiles, floors, oil cloths, carpets, etc. Designs—all these—coming from the child's own brain and worked out by its own fingers, without assistance or suggestion from the kindergartner.

DESCRIPTION OF THE SCHOOL ROOM.

The following details, prepared by Mrs. Kate D. S. Wiggin, the Superintendent of the Silver Street Kindergarten, will give an intelligent idea of the model school room:

The room is forty by fifty-five feet, having seven large windows. The children sit in families of fifteen or twenty, the rows facing each other in the four corners of the room, the center being left free for games, marching, gymnastics, etc., and painted in circles crossed by straight lines, as a guide to the feet. All the woodwork is painted in two shades of brown, with brilliant scarlet moldings on doors, baseboards, and windows. This, with a wide frieze of vivid red on the cream-colored wall, gives a gorgeous effect, very fascinating to the children. The walls are hung with pretty wood-cuts, engravings, and colored pictures of various kinds. This is not precisely high art, but, nevertheless, there is not a poor picture in the room. We have a piano, of course, many specimens of diverse kinds for use in object lessons, a sand table, a small aquarium, some growing plants, and many vases of flowers.

The following is a programme of the daily exercises followed by the Free Kindergarten of California:

TABLE II.

PROGRAMME.—Conversation and singing from 9 to 9:30. First period, 9:30 to 10:05. Second, 11 to 11:45. Games at 10:30. This programme has no provision for songs, games, marching, and gymnasium.

MORNING.	First Division.	Second Division.	Third Division.	Fourth Division.
Monday	Gift Lesson. Group Work.	Pricking or Tablets. Drawing Books.	Gift Lessons. Drawing Books.	Dictation in Sticks, With Objects. Weaving.
Tuesday	Dictation in Sticks. Paper Cutting or Modeling.	Gift Lesson. Weaving.	Pricking. Sewing.	Drawing. Sewing.
Wednesday ...	Dictation in Drawing. Paper Folding.	Dictation in Sticks. Sewing.	Stick Dictation. Slate Drawing.	Gift Lessons. Color or Modeling.
Thursday	Number. Weaving.	Drawing Dictation. Paper Folding.	Number. Weaving.	Pricking. Paper Folding.
Friday	Pricking or Sewing. Drawing Books.	Number. Modeling or Paper Cutting.	Color or Tablets. Paper Folding.	Number. Weaving.
AFTERNOON.		[Lunch.]		
Monday	Invention.	Pricking or Tablets.	Ball Exercises.	Thread Game.
Tuesday	Story, for all Divisions.			
Wednesday ...	Ball Exercise.	Group Work.	Chain Making, Modeling, or Sewing.	Outline Drawing.
Thursday	Thread Game.	Gymnastics.	Group Work.	Group Work.
Friday	Week's Work Completed.	Slates.	Thought Games; or Shells, Chains, or Beans.	Picture Books or Sewing.

Children from five to six years occupy First Division, and those three or four years the Fourth.

GOLDEN GATE KINDERGARTEN ASSOCIATION.

The rapid growth of this association is mainly due to the zeal, devotion, and untiring efforts of its President, Mrs. Sarah B. Cooper. Her name is a household word among kindergarten workers. About two thousand five hundred children who are enrolled in all the kindergartens of San Francisco, have reason to bless the name of this good lady.

San Francisco stands second only to St. Louis among the cities of the United States in the extent of its kindergarten work, but yields the palm to none in the quality of that work. The rapid growth of the Golden Gate Association will be best shown by the summarized statement of progress made from year to year, as follows:

TABLE J.J.

Tabulated Statement of Kindergarten Progress.

YEAR.	Class.	Total Enrollment.	Total Receipts.
Close of first year	Two classes	109	\$1,805 70
Close of second year	Four classes	228	3,227 90
Close of third year	Five classes	297	3,446 85
Close of fourth year	Six classes	342	4,700 20
Close of fifth year	Eight classes	467	10,624 85
Close of sixth year	Twelve classes	819	14,016 15
Close of seventh year	Thirteen classes	983	16,507 92
Close of eighth year	Fifteen classes	1,105	17,307 50

The United States Commissioner of Education, Hon. N. H. R. Dawson, has kindly furnished the bureau with advanced sheets of his report on kindergartens to Congress for the year 1886-87, from which the following is taken:

There are five hundred and forty-four kindergartens reported to this office for the present year, with one thousand two hundred and fifty-six instructors and twenty-five thousand nine hundred and twenty-five children, a considerable increase over the year 1885-86.

The majority of kindergartens, whether giving or not giving free tuition, are still supported by private means; only one hundred and eighty-five of the whole number being supported by public funds. St. Louis, Milwaukee, and Philadelphia are the only cities in which kindergartens seem to be firmly established as a part of the public school system.

In January, 1887, the kindergartens, which for several years had been under the care of the Sub-primary School Society, of Philadelphia, were formally transferred to the Board of Education, and \$15,000 were appropriated for their support. Edward T. Steel, President of the Board of Education, in accepting the care of these kindergartens in the name of the City of Philadelphia, said: "While I am earnestly in favor of what is known as higher education as a part of the public school system, I believe that it is secondary to the necessity for a perfectly organized system of instruction for the youngest children; and when these kindergartens shall become as extensive as the other grades of our school—which I believe they will—and manual training (the principle of which is one of the leading features of the kindergarten system) shall be in practice throughout all of our schools, we shall have accomplished the highest position possible to attain in a system of public education, and have fulfilled a duty in regard to youth which the enlightenment and civilization of the times demand."

Boston will soon follow the example of Philadelphia. In December, 1887, the Committee on Examination made a report on the establishment of kindergartens now supported by Mrs. Shaw, and recommended an appropriation of \$20,000 for the year 1888-89 for the support of these and others in different parts of the city.

Other cities are taking steps in this direction, among them Lynn, Massachusetts; Hartford and New Haven, Connecticut; Des Moines, Iowa; and Ionia, Michigan.

For the present year there are forty-nine training schools reported, with eighty-five instructors and five hundred and twenty-four pupils. Eight of these are connected with public Normal Schools or supported by public funds, and five are supported by free kindergarten associations.

Missouri has the largest number of kindergarten pupils, six thousand and eighty-one; then follows California, two thousand eight hundred and fifteen; New York, two thousand eight hundred and thirteen; Illinois, two thousand six hundred and eighty-four; Wisconsin, two thousand four hundred and ninety-one; Pennsylvania, one thousand eight hundred and ninety-nine; and Massachusetts, one thousand four hundred and forty-six. All the other States enumerated in the report have less than one thousand pupils.

TABLE K. K.

Statistics of Kindergartens in California for 1883-'87; from Replies to Inquiries by the United States Bureau of Education.

	Post Office Address.	Name of Kindergarten.	When Established	Name of Conductor.	Number of Assistants	PUPILS.			ANNUAL CH'G FOR TUITION.		How Supported.
						Number in Kindergarten	Number in Connecting Class	Between what Ages Admitted	In Kindergarten	In Connecting Class	
1	Arcata	Arcata Kindergarten	1887	Miss M. L. Cutler	1	25	---	3-7	\$20	---	Tuition.
2	Berkeley	Berkeley Kindergarten	1887	Alice Halmina Byrke	1	12	---	3-8	42	---	Tuition.
3	Fresno City (J St.)	Fresno City Kindergarten	1886	Gertrude H. Wilson	---	35	12	2-10	43	43	Tuition.
4	Livermore	Livermore Kindergarten	1883	Grace Kimball	0	16	0	3-8	42 ¹	42 ²	Tuition.
5	Los Angeles (Sansevain St.)	Sansevain Free Kindergarten	1884	Miss Mabel Corey	1	40	---	3-6	---	---	Charity.
6	Marysville	Froebel Kindergarten and Primary School	1887	Henrietta Casebolt	1	16	11	2-10	36	48	Tuition.
7	Mayfield	Stanford Free Kindergarten, No. 7	1886	Miss Mary Lindberg	1	50	---	2-6	0	---	Charity.
8	Menlo Park	Stanford Free Kindergarten, No. 6	1885	Miss Emma Dixon	1	50	---	2-6	0	---	Charity.
9	Oakland	Miss Dyer's Kindergarten	1884	Miss Ruth Dyer	1	10	10	4-9	45	---	Tuition.
10	Oakland (Market and Twenty-first Sts.)	Market Street Free Kindergarten*	1883	Miss Grace E. Barnard	1	60	0	2-6	0	---	Charity.
11	Oakland (Pacific and Peralta Sts.)	Newland Free Kindergarten	1886	Miss Elizabeth Betts	1	70	---	2-6	0	---	Charity.
12	Oakland (659 $\frac{1}{2}$ Broadway St.)	Oakland Free Kindergarten, No. 1	1880	Miss Abbie H. Houseman	2	90	0	2-6	0	---	Charity.
13	San Francisco (54 Clementina St.)	Adler Kindergarten	1884	Anna L. Manning	1	60	---	3-6	0	---	Charity.
14	San Francisco (1015 Leavenworth St.)	Miss Boyd's School and Kindergarten	1882	Flora S. Boyd	2	(12)	---	5-0	44	45	Tuition.
15	San Francisco (Pacific and Polk Sts.)	Buford Free Kindergarten	1882	Miss A. J. Cullen	4	64	---	2-6	0	---	Charity.
16	San Francisco (64 Silver St.)	Grocker Kindergarten	1882	Miss Nora A. Smith	+2	80	0	3-6	0	---	Charity.
17	San Francisco (1013 Gough St.)	Miss Dittmer's Kindergarten	1885	Miss E. Dittmer	1	20	10	3-7	45	36	Tuition.
18	San Francisco (64 Silver St.)	Eaton Kindergarten	1882	Miss Alice M. Flint	+2	75	0	3-6	0	---	Charity.
19	San Francisco (512 Union St.)	Emily Faithful Kindergarten	1881	Miss Cora Griffin	1	50	0	2-6	0	---	Charity.
20	San Francisco (934 $\frac{1}{2}$ Harrison St.)	First Congregational Church Kindergarten	1884	Miss Charlotte F. Williams	1	65	---	2-6	0	---	Charity.
21	San Francisco (334 Beale St.)	Flora Sharon Kindergarten	1886	Mrs. Sumner Johnson	1	86	0	2-6	0	---	Charity.
22	San Francisco (512 Union St.)	Hearst Kindergarten	1883	Miss Eva Taylor	1	50	0	2-6	0	---	Charity.

23	San Francisco (512 Union St.)	Helping Hand Kindergarten	1887	Miss Nellie Moore	0	38	24-6	0	Charity.
24	San Francisco	Jackson Street Kindergarten	1879	Miss Belle Scott	2	80	0	2-6	0
25	San Francisco (116 Jackson St.)	Jackson Street Produce Exchange Kindergarten	1884	Miss Belle Scott	1	30	0	2-6	0
26	San Francisco (512 Union St.)	Kahler Free Kindergarten	1887	Miss Stella Stovall	0	50	0	2-6	0
27	San Francisco (Fulton St., near Franklin)	Kindergarten, Children's Day Home							
28	San Francisco (Dolores and Seventeenth Sts.)	Kindergarten, College of Notre Dame	1886		2	50	4-8		Tuition.
29	San Francisco (421 First St.)	Kindergarten, Convent of Our Lady of Mercy	1882	Sister Mary Elizabeth	3	67	2-6		Tuition.
30	San Francisco	Kindergarten, Ladies' Protection and Relief Society							
31	San Francisco (1018 Folsom St.)	Kindergarten, No. 4	1880	Lucy J. Gamble	1	60	0	3-6	0
32	San Francisco	Kindergarten, Protestant Orphan Asylum	1881						
33	San Francisco (218 Brannan St.)	Mail Dock Kindergarten	1886	Miss Mary J. Scheutze	1	62	24-6	0	Charity.
34	San Francisco (1810 Sacramento St.)	Model Kindergarten*	1880	Miss Emma Marvvedel		30	3-12		Tuition.
35	San Francisco (514 Howard St.)	Occidental Kindergarten	1880	Fredrica Fox	0	36	0	3-6	Charity.
36	San Francisco (Twenty-sixth and Bartlett Sts.)	Pacific Kindergarten, No. 1	1886	Mrs. M. E. Arnold		70	0	24-6	0
37	San Francisco (Eighth and Harrison Sts.)	Pacific Kindergarten, No. 2	1886	Mrs. M. E. Arnold		80	0	24-6	0
38	San Francisco (64 Silver St.)	Peabody Kindergarten	1883	Miss Helen M. Garrison	41	40	0	3-6	0
39	San Francisco (1519 Sacramento St.)	Private School and Kindergarten	1879	Mrs. Mary E. Ward	1	9	0	4-0	35
40	San Francisco (806 Sansome St.)	Silver Star Kindergarten	1884	Miss Bertha H. Bossé	3	100	0	3-6	0
41	San Francisco (1906 Mason St.)	Stanford Free Kindergarten, No. 1	1884	Miss Louise Patch	1	80	0	2-6	0
42	San Francisco (1906 Mason St.)	Stanford Free Kindergarten, No. 2	1884	Miss May Loveland	1	80	0	2-6	0
43	San Francisco (Eighth and Brannan Sts.)	Stanford Free Kindergarten, No. 3	1884	Miss Jennie Wheaton	2	152	0	2-6	0
44	San Francisco (Eighth and Brannan Sts.)	Stanford Free Kindergarten, No. 4	1885	Miss Anna Herrick	2	73	0	2-6	0
45	San Francisco (3270 Mission St.)	Stanford Free Kindergarten, No. 5	1885	Miss Mary Gamble	2	85	0	2-6	0
46	San Francisco (Capp and Seventeenth Sts.)	Stanford Free Kindergarten		Miss Lily Ransom	1	68	0	3-6	0
47	San Francisco (Webster and Fulton Sts.)	Willard Kindergarten	1884	Miss Jennie C. Parker and Mrs. Annie S. Porter	0	52	24-7		Tuition and charity.
48	San Francisco (922 Post St.)	Zeitska Institute Kindergarten	1876	Mrs. Taubmann	1	25	20	3-7	50
49	San José (253 Balbach St.)	German-American Kindergarten	1885	Miss Anna L. Wehner	1	20	4	3-8	45

* From the report of the Commissioner of Education for the year 1885-6. † Also assisted by pupils of the California Kindergarten Training School.

TABLE K K—Continued.

	Post Office Address.	Name of Kindergarten.	When Established	Name of Conductor.	Number of Assistants.	Pupils.			Annual Cost for Tuition.	How Supported.
						Number in Kindergarten	Number in Connecting Class.	Between what Ages Admitted.	In Kindergarten	In Connecting Class.
51	San José	Model Kindergarten, University of the Pacific	1887	Miss Willette A. Allen	2	20		4-6	\$40	Tuition.
52	San José (Santa Clara St.)	Notre Dame Kindergarten	1886		4	100		3-6		Tuition and charity.
53	San José (Guadalupe St.)	San José Kindergarten	1886	Miss Eva Mackenzie	1	44		5-7	0	Public funds.
54	San Rafael (Fourth and C Sts.)	San Rafael Kindergarten	1887	Miss Eva Pettit	2	40		3-6		Tuition and charity.
55	Santa Cruz (Temperance Hall, Mission St.)	Froebel Kindergarten	1886	Alice R. D. Gardner and Miss Adele J. Willard		12	8	3-10	†2½	†2½

† Charge per month.

SAN FRANCISCO PUBLIC KINDERGARTEN.

The Superintendent of Public Schools in San Francisco, in his report for 1886-7, says: "The introduction of any portion of the work into our public schools is as yet simply an experiment, the wisdom of which time alone can test. The system can not be rendered efficient without a thorough training of the teachers in its principles and practice, and, therefore, I think that the Board of Education has acted wisely in affording proper opportunities to teachers to acquaint themselves with the principles of the system. If this system of instruction can be made a successful and valuable adjunct to our public schools, it will be only by means of a class of teachers specially and well trained in the nature of it, and in the proper modes of employing or adopting it in connection with their work. The virtue of the kindergarten methods no one can gainsay; but they can be made available with children in all grades of school work only when rightly comprehended by the teachers."

CALIFORNIA KINDERGARTEN TRAINING SCHOOL.

The want of having trained teachers for kindergarten work will soon, if not already, be supplied by the training school in Silver Street, San Francisco, under the able superintendence of Mrs. Kate D. S. Wiggin.

The following particulars relating to this school are taken from her report:

The system of training requires nine months, and during that time the students are obliged, in order to gain the necessary practice and opportunity of observation, to assist in the kindergarten three days each week. This enables us to take charge of more children with less paid teachers. There is no lack of individualizing, however. The children are divided into "families" of twenty or twenty-two, according to their ages, and presided over by one teacher, either the head kindergartner, paid assistant, or student. The superintendent trains two assistants specially for Silver Street; therefore they teach there throughout the school year, and being with the same children daily acquire good management and succeed admirably after two or three months' experience. This gives us three head kindergartners, one trained assistant (paid not by the society, but by the teacher of the Crocker class), and two regular student teachers—six persons in all. The other students alternate in the care of classes.

The training school furnishes eleven assistants to the kindergartens of the Golden Gate Association, six to kindergartens of other charitable associations, and sends its students to observe and lend a helping hand wherever their services are specially needed.

An informal conversational examination of candidates is always held by the teachers whenever an applicant for training presents herself. The necessary qualifications are: fair general culture, including, if possible, some scientific knowledge of plants and animals, but, especially, love of children, love of teaching, refinement of moral sentiment and manners, and ability to sing.

The sessions are held three times a week, but most of the intervening time will be necessarily taken up in study, writing abstracts of lectures on the gifts and occupations, and practical work and observation in the kindergarten.

If, after one or two months' study, it shall be found that any person has mistaken her vocation, she will be at liberty to withdraw from the class. It is not every good and intelligent person that can make a good kindergartner, but only those of suitable temperament.

Any pupil may study an additional half or whole year without charge.

CHAPTER V.

TECHNICAL EDUCATION IN EUROPE.

In an investigation of this character it is well to know what other countries are doing in the same direction, and a brief summary of the condition and progress of technical education in Europe will not be out of place in this report.

A commission, composed of distinguished and eminently practical men, was appointed by the English Government in 1881 "to inquire into the instruction of the industrial classes of certain foreign countries in technical and other subjects, and into the influence of said instruction on manufacturing and other industries at home and abroad." Their report appeared in full in 1885, and it gave an exhaustive account of the condition of technical education in Europe. A bill was introduced at the last and another at the present session of Parliament "to make further provisions for technical instruction" in England, but was not acted upon in consequence of the pressure of business in other directions. It was based upon the facts furnished by the commission, which showed that England was behind in the race of mechanical and manufacturing progress.

With reference to the progress of technical education the report says:

Technical high schools now exist in nearly every continental State, and are the recognized channel for the instruction of those who are intended to become the technical directors of industrial establishments. Many of the technical chemists have, however, been and are being trained in the German universities. Your commissioners believe that the success which has attended the foundation of extensive manufacturing establishments, engineering shops, and other works on the continent, could not have been achieved to its full extent, in the face of many retarding influences, had it not been for the system of high technical instruction in these schools, for the facilities for carrying on original scientific investigation, and for the general appreciation of the value of that instruction and of original research which is felt in those countries.

With the exception of the Ecole Centrale of Paris, all these schools have been created and are maintained almost entirely at the expense of the several States, the fees of the students being so low as to constitute only a very small proportion of the total income. The buildings are palatial, the laboratories and museums are costly and extensive, and the staff of professors, who are well paid according to the continental standard, is so numerous as to admit of the utmost subdivision of the subjects taught. The numerous young Germans and Swiss, who are glad to find employment in our own manufactories, have almost without exception been educated in one or other of the continental polytechnic schools.

Your commissioners cannot repeat too often that they have been impressed with the general intelligence and technical knowledge of the masters and managers of industrial establishments on the continent. They have found that these persons, as a rule, possess a sound knowledge of the sciences upon which their industry depends. They are familiar with every new scientific discovery of importance and appreciate its applicability to their special industry. They adopt not only the inventions and improvements made in their own country, but also those of the world at large, thanks to their knowledge of foreign languages and of the conditions of manufacture prevalent elsewhere.

SCHOOLS TO TRAIN FOREMEN.

The creation abroad of technical schools for boys intending to become foremen is of much more recent date than that of the polytechnic schools. To this statement the foundation during the First Empire of the three French Ecoles des Arts et Métiers, at Châlons, Aix, and Angers, is only an apparent exception, because they simply vegetated until their reorganization within the last twenty-five or thirty years. Mining schools were, however, established in Prussia in the last century, and in France about 1817. Among the examples of schools for foremen are those of Winterthur in Switzerland, Chemnitz in Saxony, and Komotau in the Austrian dominions, principally for engineers, and the Ecole des Mines at St. Etienne, the latter more especially for mining and metallurgy. The theoretical instruction in these schools is similar in character but inferior in degree to that of the great polytechnic schools. On the other hand considerable attention is devoted in these schools to practical instruction in laboratories and workshops, which is not the case in polytechnic schools. In Prussia a beginning has been made in the establishment of such secondary technical schools, but, in the words of the report, "its execution will be tedious and costly." In Bavaria the Industrie-Schulen, which are technical schools of a grade inferior to the polytechnic school, give both theoretical and practical instruction, the latter in some cases highly specialized, in preparation either for direct entrance on an industrial career, or for further study in the polytechnic school. In France technical schools of a somewhat lower type are being established all over the country. The one at Rheims, previously described, is an excellent example of these schools. The boys from the Rheims school either enter the Ecole des Arts et Métiers at Châlons, or go into manufactories or into business, in each case with a fair knowledge of theory and manipulation, as mechanics or as chemists.

It is important to bear in mind that the French schools of the type of that at Rheims, though virtually advanced schools, now rank as superior elementary schools, to which the pupils are consequently entitled to claim admission without the payment of any fees.

ART SCHOOLS FOR ARTISANS.

With reference to the subject of drawing, we cannot too often call attention to the extraordinary efforts which are being made abroad for instruction in art, more especially as applied to industrial and decorative purposes, and to the important influence of this instruction in furnishing employment for artisans on the continent. In nearly all the places abroad which your commissioners have visited, they have found that drawing is an obligatory subject of instruction in the primary school, and that it is regarded as of equal importance with writing. The number of hours which the children devote to lessons in drawing abroad is frequently as many as three per week, whereas in England the subject is not only not obligatory, but in about three fourths of our elementary schools no instruction whatever is given in this subject, and in those schools in which drawing is taught the time devoted to it rarely exceeds one hour per week, and even that not always regularly. This want of attention, together with the absence of competent teachers, proper models and methods, and adequate inspection, fully accounts for the inferiority to which we have referred. Your commissioners are of the opinion that sound instruction in the rudiments of drawing should be incorporated with writing in all primary schools, both for girls and boys, by which, also, according to the experience of competent authorities, the writing would be much improved. Something in this direction has already been done.

We are of opinion that more attention than has hitherto been devoted to it should be directed to the subject of modeling in the elementary schools. Modeling is an exercise of great importance to the future workman, and its rudiments can well be taken up, as in continental schools, at the earliest age.

Your commissioners see no reason why, since grants are made on needlework in girls' schools, they should not be made on manual work in boys' schools. This instruction may be given so as not to interfere with the ordinary work of the school. It has been proved that this can be done, the boys being most eager to return for handicraft teaching after school hours.

Whenever more attention shall be given to drawing, and especially to mechanical and geometrical drawing, in the ordinary and the higher elementary schools, it will be proper and desirable that the work executed in the shops attached to these schools should be made from drawings prepared by the children themselves.

TECHNICAL EDUCATION IN FRANCE.

Manual instruction in the schools of France is now firmly established, although fifteen years ago there was but one school in that country in which technical instruction was combined with other elementary education. Tool instruction is now given to pupils of ten years and upwards in all the free public schools of Paris, under the compulsory law of 1882.

In all the primary schools of Paris drawing is taught from models and casts, in preference to flat examples and copies. In addition to the municipal apprenticeship schools of France, there are two other kinds which are largely attended, viz.: (1) apprenticeship schools, sustained by great corporations for the benefit of children of their employés; and (2) those conducted by charitable associations. These schools do not confine themselves to teaching a single trade. The French Government sustains many simple apprenticeship schools, the main effect of each being to foster some trade, as the watchmaking school at Sevres. A review of the reports of the British Royal Commissioners on Technical Education, by C. O. Thompson, contains the following additional particulars relating to French technical schools:

The primary communal school of the Rue Tournefort was for a long time the only school in France in which trade teaching was combined with other elementary education; now it has many imitators. It was started on its present footing in 1873. It appears that the French add the shop work to the time spent in what may be called literary work. In the lowest class the children are six years old, and receive three lessons a week, of one hour each, in handicraft. From ten years old and until graduation they have eighteen hours in the shop. There are three hundred and sixty children in this school, and they are generally able to earn, on graduating, at the age of thirteen to fifteen, about \$1 a week.

The studies of the school are drawing, modeling, molding, and carving; arithmetic and geometry; geography and history; physics; anatomy, physiology, and hygiene; French reading and writing; and civil government, technology, and morals. The duties of the workshop are lathe and forge work, joinery, and a little higher machine work.

The reports of the inspectors tending to cast some suspicion on the quality of the literary work of this school, the authorities of the City of Paris, in their further experi-

ments in the introduction of manual training into ordinary primary schools, have confined themselves to teaching more advanced drawing from models, and the use of ordinary tools for working wood and iron, without attempting to teach special trades. There are about fifty schools where these experiments are in progress. It is already apparent that the shop work tends to concentrate along the lines of dominant French industries, and the effort to avoid teaching trades will not be very successful.

These schools must not be confounded with another sort, viz.: the municipal apprenticeship schools, from which they are quite distinct, in respect to the age of the pupils, the course of study, and the end in view. The most famous of these is that in the Boulevard de la Villette, which has been in operation since December 8, 1872.

It is a day school, designed to fit boys to be good artisans, and proves its success by pointing to the large number of its graduates who have been successful in the fields for which the school prepared them. No pretense is made that the shop work serves any educational purpose other than to teach the boys to use tools and machines. The hours are from 7 A. M. to 7 P. M., six days a week for three years, allowing two hours a day for meals and recreation. The boys enter at fourteen. During the first two years they work four hours in the school and six in the shops. In the third year, two in the school and eight in the shops. In the first year they are taught the nature and conversion of material; in the second they pass to actual construction. In the first year the work is uniform for all; in the second, a trade must be chosen and followed.

In 1881-82 there were two hundred and fifty pupils; one hundred and seven in the first year, eighty-one in the second, and sixty-two in the third. The number of absentees did not equal 7 per cent of the whole, and was mainly confined to the entering class. A considerable number leave at the end of the first year for many causes, usually because they are unfit for the work. Those who leave at the end of the second year generally find remunerative employment.

The annual cost of maintenance is about \$15,000, or a little less than \$60 per pupil.

TECHNICAL EDUCATION IN GERMANY.

The consular officer of the United States in Mayence, Germany, Mr. J. H. Smith, writes that there are about two hundred and fifty technical schools in Germany. The textile and metallurgical industries especially are well taught in these schools.

Mr. Samuel Smith, the well known member of Parliament, says:

There is no such thing as an uneducated class in Germany. There are no such things, speaking broadly, as neglected and uncared for children.

No honest observer can doubt that in many respects the Germans are already ahead of us (the English), and they are making far more rapid progress than we are.

They are applying technical science to every department of industry in a way that Englishmen have little idea of. Their polytechnics and their practical technical schools are far ahead of anything we possess in England; the leaders of industry are far better trained; the workmen are far better educated, and far more temperate and thrifty than ours are. Wherever the Germans and English come into competition upon equal terms, the Germans are beating us, because they are organized, disciplined, and better trained than we are.

Here is a description of the technical schools at Chemnitz, taken from a report of the United States Bureau of Education:

There is no polytechnic or technical high school where shop work is required as a preliminary condition of admission, but the Royal Foremen School at Chemnitz, of the secondary order, affords a good example of how this plan may be pursued.

Chemnitz is a Saxon town of ninety thousand inhabitants who are principally employed in the following establishments, viz.: Forty-six machine shops for machine building, ten loom works, three hosiery frame factories, and eighty-two cotton, woolen, and silk mills. The manufacture of hosiery and gloves is the leading industry. The only locomotive works in Saxony, Hartmann's, is in Chemnitz, and employs about two thousand men. The town is sometimes called the Manchester of Germany.

General education is assiduously cultivated and is of the most thorough sort; in fact, it is the strong foundation upon which technical schools securely rest.

In addition to this, continuation schools are maintained in the evening, three hours each, for those who, through misfortune of any kind, have failed to secure the essential advantages of the public instruction. There were nine hundred and ninety-three of these Fortbildung scholars in Chemnitz in 1878.

Technical education in Chemnitz is conducted partly by the State and partly by corporations. The State has a group of schools, which are all in the new buildings on the Schiller Platz, completed in 1877. Here are one hundred and thirty rooms, with an aggregate area of ninety-five thousand square feet, six hundred and twenty-five students in attendance, and fifty-two instructors. The annual expense of maintenance in 1883 was

\$46,200, or \$70 86 per student. The buildings cost \$439,715. The same buildings and accommodations in Worcester, Massachusetts, a city of about the same size and sort, would cost at least \$700,000.

The State technical schools are the Higher Technical School, with one hundred and fifty-three students; the Royal Building School, with one hundred and seventy students; the Royal Foremen School, with two hundred and thirty students; the Royal Drawing School, with one hundred and eleven students; or a total, less twelve twice reckoned, of six hundred and fifty-two students.

CHAPTER VI.

OPINIONS ON MANUAL TRAINING AND INDUSTRIAL EDUCATION.

Governor Bartlett cordially approved of my proposition to further his views upon industrial education by making it one of the special subjects of investigation by this bureau. It was his intention, had he lived, as conveyed to me by his own lips, to give practical proof of the intense interest he felt in the subject, by either founding a school for industrial training himself, or doing so in coöperation with others.

In order to ascertain how far the views of the Governor were concurred in by public opinion, I followed the example of the distinguished Commissioner of Labor of New York, Mr. Charles F. Peck, and communicated by a circular letter with a large number of citizens throughout the State. I regret to say that the responses were few and far between, but there is a sufficient number to show what a consensus of opinion there is on the advisability of introducing manual training in connection with our public school system.

The following questions were addressed by this bureau to a large number of teachers and persons likely to be interested in the question of education:

1. What, in your opinion, are the relative percentages of pupils in your county who study for the learned professions, clerical and commercial pursuits, agriculture, mining, and mechanical industries or trades?
2. What are the facilities, if any, for a boy or girl learning a trade in your county?
3. Do you favor manual or technical training as a part of the public school system of this State?
4. What should be the scope or extent of this training?
5. What particular branches of technical knowledge would you deem best for the interests of your section of the State?
6. Do you favor an apprenticeship law, and for what reason?
7. Are skilled mechanics in your county, such as are engaged in watch making, gold, silver, and jewelry work, engraving, lithographing, wood cutting and carving, ornamental painting, decorating, and other high grades of mechanical labor, of American or foreign birth?

In reply to the first question—

First—What, in your opinion, are the relative percentages of pupils in your county who study for the learned professions, clerical and commercial pursuits, agriculture, mining, and mechanical industries and trades?

The answers received were so indefinite and unsatisfactory that it would be useless to give them.

In reply to the second question—

Second—What are the facilities, if any, for a boy or girl learning a trade in your county?

The School Superintendents of the following counties answered as follows:

Contra Costa: "The number of places open to boys is limited and cannot supply the demand. The boys who wish to learn a trade are of necessity compelled to seek the cities and enter the large shops."

Del Norte: "None, save by ordinary workmen."

Kern: "Poor."

Lassen: "Almost none."

Los Angeles: "Can't answer intelligently."

Nevada: "Very poor; the plain blacksmith's trade is about all a boy can learn here."

San Luis Obispo: "Such as are offered by the limited number of shops."

The Principal of the Normal School of San José, County of Santa Clara: "There are no facilities for learning a trade. We give a practical course in chemistry and mechanics, and are now fitting up rooms for giving some prominence to industrial pursuits, hoping to give considerable manual training. We shall do wood work and some metal work."

Tehama: "Confined to only a few trades."

Trinity: "A few blacksmith and carpenter shops."

Tuolumne: "Very poor."

In reply to the questions—

Third—Do you favor manual or technical training as a part of the public school system of this State?

Fourth—What should be the scope or extent of this training?

Fifth—What particular branches of technical knowledge would you deem best for the interests of your section of the State?

The following answers were received from the same gentlemen:

Superintendent W. A. Kirkwood, of Contra Costa: "Third.—I do favor such a system. Fourth.—In town schools I think the rudiments of several trades might be taught; I think only the rudiments of a trade should be attempted. In country districts little or nothing can be accomplished. Fifth.—Agriculture in all its branches. The study of materials for building: the use of tools; housework and sewing; civil engineering."

Superintendent S. G. Wright, of Del Norte: "Third.—To such an extent as would furnish a basis on which they may become good workmen. Fifth.—The lines would be for this country, mechanics as applied to the lumber business, and agriculture as applied to dairying."

Superintendent J. H. Shannon, of Inyo: "Third.—I do; especially where it can be done systematically in large, graded schools. Here I do not think it possible, our terms being short and our teachers overworked in the general course of study; also entirely without the conveniences, with no available means of obtaining such. Fourth.—The scope of the question covers considerable ground. If for our young ranchers, I would say a pretty thorough training in the use of carpenter's tools, harness work, and painting. Fifth.—In our section, metallurgy, civil engineering, mechanical drawing."

Superintendent Myra A. Parks, of Lassen: "Third.—In my opinion manual or technical training should form a part of the public school system of this State, and to such an extent as shall give the pupil an insight into the various branches of industry, and guide him in his choice of that occupation to which his nature is best adapted. Fifth.—The branches best adapted to this section of country would be scientific farming and carpentry."

Superintendent A. J. Tiffany, of Nevada: "Third.—I favor it in San Francisco, and perhaps in a few of the larger cities. Fourth.—It should be thorough training in the elements only. Fifth.—Mining and engineering."

Superintendent W. W. Armstrong, of San Luis Obispo: "Third.—I am in favor of technical education in our public schools, and would urge that a liberal proportion of the public funds be devoted to that purpose, instead of its being expended, as at present, in the maintenance of high schools, or

for any other purpose beyond an ordinary common school education. This technical training should not fall short of fitting our young men and women for the ordinary useful pursuits of life. In my judgment, one of the most fruitful causes of discontent among our common people is the prevailing system of education, which, while it takes from seven to twelve years of the child's life, simply educates them to the point of looking with disdain upon manual labor, and fails to so equip them that they may avoid its necessity. The experiments in the direction of technical training covered by State Normal Schools, the Normal Branch of the Girls' High School in your city, and the commercial classes, have certainly been so satisfactory as to greatly encourage its advocates. The recent legislation affecting the grammar school course is in the right direction, and it would seem that we are just ready for the establishment of technical or industrial schools in connection especially with those schools which have elected to pursue the grammar school course. The next Legislature should not fail to take further steps toward this end. I shall be glad at some future time to outline a plan of establishing at least one industrial school in each county."

Professor Chas. H. Allen, of Santa Clara: "Not as a part of the system coequal with the other work of schools. I think the State might wisely extend a helping hand to encourage private manual schools. The public school work is now overburdened and needs relief, not additional work. In the private schools as wide as the patronage demands. At first preparatory to any trade, and afterwards differentiating to suit the calls. Orchardry, unquestionably; this comprising growing of trees, budding, grafting, hybridizing, as well as all means for protecting growing trees and fruits, and the best processes of curing, packing, and marketing."

School Superintendent L. W. Valentine, of Tehama County, answers: "To a certain extent I favor manual training. It should not extend further than those rudiments which are common to most of the trades, or at any rate to a large proportion of them, and the kind of instruction would vary slightly with the locality. Our section of the State is agricultural, and the instruction given in our schools should, so far as practicable, be such as will fit our children for such pursuits. The branches of technical instruction taken should to a large extent be optional with the pupils' parents. Practical agriculture should be taught in all schools, and also the rudiments of the trades. If a boy expects to devote himself to agricultural pursuits, he should have the option of taking those branches of special instruction as will prepare him for this, and vice versa."

From Professor Joseph Le Conte, M.D., LL.D., Professor of Geology and Natural History, State University:

UNIVERSITY OF CALIFORNIA, }
BERKELEY, CAL., January 13, 1888. }

Hon. JOHN J. TOBIN, *Labor Commissioner*:

I received your letter and circular to-day. I wish I had time to answer as fully as its importance deserves. This, however, seems hardly necessary, as I have recently expressed my views on this subject in an address before the Teachers Association at their last meeting at Berkeley. This address, I suppose, will shortly be published. In the meantime, however, I will now give a bare outline of most important points:

First—I do very earnestly favor the introduction of *manual training* as a part of our public school system.

Second—Your second question opens a very wide field of thought. You will observe that I use the term *manual training* instead of *industrial training*. I have done so because this term better expresses my view as to the main object of the introduction of hand work into the schools. Industrial or technical schools are liberally supported by many European Governments. They are intended as a direct preparation for industrial life. They are a Government help to the industrial classes. These classes become thus, in some sense, the beneficiaries of the Government. Now we in this country do not recognize any such classes in the schools; nor do the industrial classes ask any special help from the Government. Our schools are intended only to make efficient men and women.

If these views are correct, then hand training ought to be introduced into the schools, not only because it prepares for industrial life, but also and *chiefly* because it is a fundamentally important agent of mind training. It is not intended specially for any class, but equally for all. Not the artisan alone, but every one ought to have perfect use of hand, because without it the most thoroughly efficient manhood is impossible. In our schools we have drifted too far from the method of nature, where hand and eye and brain work together in mutual help. We must come back to it.

As to the best practical mode of carrying out these principles, I do not think myself competent to advise; I leave it to those better acquainted by experience with school methods than myself.

Very respectfully yours,

JOSEPH LE CONTE.

Professor C. H. McGrew, of San José, would have industrial education permeate all our public school work:

SAN JOSÉ, CALIFORNIA, January 14, 1888.

Hon. JOHN J. TOBIN, *Labor Commissioner*:

I take pleasure in answering the questions of your favor of the twelfth instant:

First—I am decidedly in favor of manual training or industrial education as a part of our public school system. The hand and the eye are the shortest avenues to the brain. In fact, the hand is, so to speak, the balance-wheel of the mind. Through the hand and the eye we get most of our ideas; the skillful hand and the cultured brain have given us all our civilizations, and make man superior to the brute. That man whose eye, hand, and brain work in unison and harmony, is the most highly educated. Manual training is necessary to build the exact imagination, cultivate a sound judgment, and give that practical knowledge of human affairs and life called common sense; and besides cultivating the powers of the mind and furnishing it with facts, manual training is necessary to cultivate the *expressive* and *creative* powers of the mind. Our current methods of instruction are most defective in teaching all-side expression and creativity. Our schools pour in, after the fashion, until the pupils are like full bags, they cannot bend; and they cannot *express* and *create* anything. Manual training teaches through experience, learns by doing, and cultivates at least two forms of expression, scarcely touched by our schools, viz.: constructing, making, and representing, as in drawing and modeling. To make a thing and draw or model it, is one of the most natural things for the child, and appeals to his instincts of activity and creativity.

I would have industrial education permeate all our public school work, in connection with every subject taught. In the primary and secondary schools, solely for its educational value; for what it is worth in sense culture and hand training; for its value in giving the mind living, interesting, and practical knowledge; for its value in directing the child's activities and cultivating the faculties naturally and harmoniously; and especially for its culture of the expressive and creative powers. Let me repeat, I would have it in all primary and secondary schools mainly for its educational value and its power to *bring out natural aptitudes and special endowments*, and not for the purpose of teaching little children or even boys and girls trades and crafts. But I would have it in our colleges, universities, and polytechnic schools, for the purpose of fitting young men and women for their life work in their special lines.

Second—I am fully convinced that this industrial education should be begun in the kindergarten, as the first grade of our public school system, because the kindergarten is the only scientific and systematic method of cultivating the senses and training the hands of little children. Children should be received at four and have at least two years kindergarten training, and then pass into the primary on the same principle and method. I would extend the manual training of the kindergarten into all higher grades up to the high school. And in the high school there should be courses of study in manual training for both boys and girls parallel with the courses in languages, mathematics, physical and natural science, all aiming to prepare boys and girls to enter upon some special line of work in the university. So I would have manual training to extend from the kindergarten to the university, inclusive; below the high school for all children, rich and poor, and at the high school manual training should converge into courses leading to some special industrial course in the university. This will give opportunity for choice and the development of special aptitude, which will be brought out before the boy and girl reach the high school grade.

Something must be done in this direction. Our schools are not giving forth the harvests of character, the manhood and womanhood, they should. There is something wrong when the majority of young men graduating from our colleges would prefer to accept a \$50 clerkship, instead of fitting themselves for positions of mechanical or civil engineers, at salaries from \$2,000 to \$4,000, which they could do in the same time. Society does not need more graduates; they are fast increasing the ranks of the worthless. Society needs men and women fitted to take up some special line of work, and do it better than it has ever been done before. Industrial education in its true sense will enable us to produce such men and women, and correct many of these narrow and false ideas of life and human worth. I do not hold the school responsible for all of them.

Society, the church, State, and all social agencies must come in for a part, but our schools must bear a portion—more for what they have not done than for what they do.

I could give other reasons for the faith that is in me on this great subject, but trust these will be enough.

Yours truly,

C. H. MCGREW,
Prof. Ed. Psychology, Science, and Art of Teaching.

Mr. J. B. McChesney, of the Oakland High School, would not engraft manual training upon the State system of schools, but leaves it for the consideration of municipal governments:

OAKLAND, January 13, 1888.

Hon. JOHN J. TOBIN:

DEAR SIR: Your printed circular requesting my opinion on the subject of manual training in the public schools in the State is at hand.

It is difficult to express my opinion on this subject briefly, without a fear of being misunderstood.

The term "industrial training" conveys a variety of ideas to the ordinary citizen, and as long as any misapprehension exists as to the meaning of the subject under discussion, all argument pro or con must necessarily be futile.

I believe in the complete education of the child; by this I mean the education of the hands and body; of the intellect and of the feelings; thus enabling him to do, to know, and to love, *i. e.*, he must be able to labor to comprehend truth and to love it. Every person who is not fairly well developed in each of these directions is more or less an element of danger in every representative government.

If my position is correct, it follows that:

First—The child should be taught to labor.

Second—That knowledge should be imparted to him which will enable him to intelligently perform the duties of citizenship.

Third—His moral nature should be so developed that his influence shall be in favor of justice and the right.

Heretofore, the State has undertaken the second, leaving the parent to attend to the first and third. At present, the trend of public opinion is in favor of having the second also cared for by the State. I believe in it to this extent and with this qualification: municipalities may give instruction in manual training, because very few parents in cities are so situated that they can give this training, however much they may wish to do so. In the country the conditions are entirely different. I therefore would not engraft this department upon the State system of schools, but leave it for the consideration of municipal governments.

The qualification is this. Trades should not be taught. The object should be to train the hand and eye in the use of tools, so that, if in after life he may wish to become a carpenter or a blacksmith, he may enter upon the acquisition of his trade with a certain preliminary equipment.

As stated above, the State for years has undertaken the second of my propositions; there is a strong pressure being exerted to have it undertake the first. By the same line of argument, and with equal if not with greater force, it may be shown that it should take up the third, *i. e.*, teach the existence and attributes of God, giving thereby a substantial and reasonable basis for the moral law.

As it is impracticable for me at the present time to enter upon an argument on these far reaching questions, I will content myself with simply stating my opinions.

Very respectfully yours,

J. B. MCCHESNEY,
Oakland High School.

Mr. W. W. Anderson, of the Sacramento High School, considers it just as necessary to train the hand and eye as the mind. Boys and girls ought to learn the first grades:

SACRAMENTO, January 13, 1888.

J. J. TOBIN, Esq., Commissioner of Labor, San Francisco:

DEAR SIR: It would be difficult to state fully my views on the points referred to in your favor of yesterday, in the time at my disposal. Perhaps, however, I can make myself clearly understood in a few words.

First—Yes, if manual training is meant; but if teaching trades is meant, most decidedly no.

The former is possible; is desirable; is urgently needed. The latter is chimerical, and is undesirable even if it were possible.

There is no limit that can be given logically to the power of the State to provide for education. The State has the right to do whatever is necessary for the welfare of its citizens. It is necessary for the welfare of the State that its citizens be intelligent and able to think each for himself. Otherwise they will be under the control of demagogues, and the electoral franchise become potential for dangerous legislation. The questions that are forcing themselves to the front, and that must sooner or later be settled at the polls, are questions

requiring careful study to be acted upon intelligently. The electors, therefore, ought to be able to think, as only intelligent persons can think, in order to settle these questions. That is only one of many reasons that justify the maintenance of an efficient system of education comprehending all grades of schools, from the kindergarten to the university.

But it is equally necessary that the citizens be able to provide each for himself and for those dependent on him. To do this each should be educated in all respects. We have hitherto turned our attention exclusively to the development of the mental faculties. It has been supposed that at home, in some way, the hand and eye would be sufficiently cultivated. When boys could not buy for a trifle all kinds of toys and every means of amusement, and when, from the circumstances of the case, boys and girls had to take no small share in the home duties, the young people grew up, to some extent, accustomed to work, and left the home impressed with the idea that work was a necessity imposed upon all. If they wanted to learn a trade they served an apprenticeship which insured considerable skill in their trade, and which involved a system of examinations to test their proficiency.

Now all this is changed. Young people can buy for a trifle what would cost considerable effort to make. Their own personal wants, therefore, do not lead them to the use of tools, or to attempt anything requiring skill. Home life is very different from what it was thirty or forty years ago. For both these reasons, therefore, our young people grow up unable to use their hands for any useful purpose.

The apprenticeship system is dead. Boys who want to learn a trade cannot do so. Not only so, but workmen themselves object to the employment of apprentices. Moreover, the introduction of machinery is more and more doing away with many branches of every trade. He who learns only one special department or branch of any trade is continually in danger of being supplanted by newly invented machinery. He is most fully equipped for life who is most intelligent, whose mind is best trained, and who has the best command of hand and eye. It is just as necessary that he have the latter as the former.

Now, trade or work schools would largely defeat their own object. They would teach trades that are continually being revolutionized by machinery. Suppose a shoemaking shop was established. Either it would involve a large amount of machinery, run at great expense, or it would require a shop in which all the operations would be done by hand. If the former, boys would, at great expense, be taught only certain parts of shoemaking, or would have to spend a long time to master all its details, and then find all or much they had learned a "lost art" from new inventions. In the latter case, they would have a trade which is rapidly disappearing. With more or less force the same objection would lie against any workshop as part of the school system. Then see the numberless trades that would have to be taught.

There could, however, be no objection whatever to the establishment of one or two such work schools, to teach a special trade, where that trade is the great business of the community (if such a community could be found), as is the case in European countries. It is especially true of agriculture. In one or two States, and in a province of Canada, an agricultural school has been established with the best results. These schools, where best, attempt nothing more than what is equivalent to high school work, although on somewhat different lines, and give an actual training in all the operations of wheat raising, orcharding, cattle raising, dairying, etc. That seems not only a legitimate, but desirable sort of school for this State, in which fruit raising, as well as the production of cereals, is so important. It would not tread on the ground of the College of Agriculture. It would prepare students, some of whom would enter that college, while others would practice on their own farms that which they had been taught the beginning of, in a scientific way, in the school.

Manual training schools do not pretend to teach trades. They claim that mind and body equally need development—that hand craft should keep pace with mind culture. Special attention is paid to freehand and industrial drawing. Then the pupils are set to work in wood, iron, and brass. The exercise of the hand and eye involve and compel a great amount of intellectual culture, and the boy leaves school feeling that skilled manual labor is honorable, and that he could soon learn any trade or use any newly invented labor-saving machine. Such a boy would not be crowded out by new machines.

Further, in this training the ideal object of education is being better reached. *All* the faculties are being cultivated. A better citizenship, a happier life is being provided for.

Second—I have already indicated the answer to this in answer to No. 1.

The whole question is only beginning to be understood. California can better afford to go "slow" and wait the results of thorough trials elsewhere, than to make expensive failures. One thing is clear: the use of the pencil ought to be required in the schools. This will necessitate a large number of thoroughly competent special teachers of drawing, for as a class teachers are not prepared to teach this subject. The demand for it is urgent. And the question should no longer be left in its present condition. Boys and girls ought to learn the first grades and be able to make a working drawing of simple objects. I mean a drawing such that a mechanic from it should be able to make the object without further guidance.

I have written very hurriedly, and am conscious that I have left many strong points untouched; others, however, will supply them. I simply wish to add my testimony in favor of manual training.

Very respectfully yours,

W. W. ANDERSON.

Professor Kleeberger, of San José, believes that the time and effort devoted to industrial training in our public schools should exceed the time and effort devoted to purely scholastic or intellectual training:

SAN JOSÉ, CAL., February 17, 1888.

Hon. JOHN J. TOBIN, *Labor Commissioner*:

DEAR SIR: Yours of January twelfth, containing inquiries in regard to industrial education, is at hand, and I reply to your questions seriatim:

First—I do favor industrial training as a part of the public school system of the State of California.

Second—I think that the time and effort devoted to industrial training in our public schools should exceed the time and effort devoted to *purely scholastic or intellectual training*; for I believe that the prosperity and permanency of our Government depend not so much upon intellectual scholarship, as upon *sense, ability, and muscle skill*. The dangers that threaten our institutions come largely from the wage earners, and those who *should be* wage earners, and I believe that increased sense and muscle-education raises the general average of ability and desire to earn and enjoy a comfortable livelihood, and decreases the tendency to bad habits, vagrancy, crime, and disaffection towards society, capital, and government.

I think that in its scope industrial training should be broad. It should include: (1), the hand and eye training of the kindergarten occupations and free hand drawing; (2), the pure sense or observation training by the objective study of plants, animals, rocks, and minerals; (3), the invention training of mechanical and architectural drawing, designing, and geometry; (4), the training in investigation *shaded* by experimental work in physics, chemistry, and other natural sciences; and (5), training in the actual use of tools, and the actual performance of work in the more common industrial occupations of wage earners, wood and metal working, building, drafting, painting, orchardry, telegraphy, type setting, sewing, cooking, and others.

My own experience in teaching large classes (thirty to fifty), of mostly young ladies, in experimental chemistry, in a laboratory where the students make, as well as use, the necessary apparatus, convinces me that all the kinds of work enumerated above can be taught to classes just as successfully, and with even better permanent results than either grammar, geography, or history.

Divisions one, two, and three could be readily combined with the essential scholastic work of our primary and grammar schools. In fact, some of our best teachers are even now doing good work in the direction indicated, and more are joining with them every day.

It is only a question of a few years, as soon as there are enough trained teachers—graduates of Normal Schools—to teach all our public schools, until these parts of the plan shall be realized.

Divisions three and four should be accomplished in what might be called industrial high schools having a two years' course, in which the forenoon work might be scholastic, and the afternoon work manual. The high schools, maintained at public expense, at present educate only that portion of our youth who are in no sense a menace or a burden to the public, and serve to raise the general average of the professions, rather than of the people as a whole. But in an industrial high school, every student would learn to do *at least one industrial occupation*, thereby raising the general average of wage earners. Moreover, attendance at these industrial high schools should be compulsory upon all who have passed the grammar school, and who are not actually earning wages, or engaged in labor at home. Such an industrial high school should exist in every city, town, and village; and might be a union school for two or more country districts, of far more value in every respect than are the Caminetti schools of the present.

Of course, the great objection to all this is its expense, and the fact that it would be an innovation, but the present cry for an innovation in the way of more practical results from our public schools will eventually demonstrate that more expense and better results will be the truest economy.

Very truly yours,

E. R. KLEEGERGER.

Mr. O. Herbst, of San Francisco, fails to see the practicability of making manual training a part of the public school system:

JOHN J. TOBIN, *Esq.*, *Labor Commissioner*:

DEAR SIR: I fully recognize the importance of manual and industrial training for young people, but I fail to see the practicability of making such training part of the course of instruction in our public school system.

Most of our schools, especially in this city, are too largely attended to allow the establishment of carpenter and other shops on the school premises, with any practical benefit to the boys, so that the extent of industrial training, in my opinion, would have to be industrial drawing. I should favor the establishment of special schools for manual and technical instruction, but I would not admit pupils under fourteen years to such schools.

Respectfully,

O. HERBST,

Principal South Cosmopolitan Grammar School, San Francisco.

If parents are not able to give industrial training to their children the State should do it:

VALLEJO, January 14, 1888.

Hon. JOHN J. TOBIN, *Labor Commissioner*:

DEAR SIR: In regard to industrial training in our public schools, my opinions are these: Every child ought to have as good an education as he is capable of receiving. If the parents are not able to give such an education to their children, the State ought to have it done at public expense.

The arrangements of the public schools should be such that they would fit the conditions and ability of each child. These arrangements should consist of the best instruction in all subjects fitted for the different pupils, according to their age and ability, and also according to their special needs and desires. They should also consist of such manual training, arranged according to the age and ability of the pupils, as will develop their mechanical and inventive powers, and also their appreciation of the beautiful, the orderly, and the useful.

With such arrangements for our schools, each child would find some course fitted to his ability and his liking, and he would remain in school until his needs in regard to education were fully supplied. Pupils would be kept in the schools longer than they are now, and fewer would become dissatisfied and leave school to become hoodlums and disreputable characters, now so common in our towns and cities.

The training of children in our public schools should consist of all that is needed to educate properly their mental, moral, and physical powers. This will be done some time in the future; because our people will learn that the cost of such an education for every child will be an investment the best, most permanent, and far-reaching that can be made.

There are but two things to prevent such an education now, and they are lack of means and lack of skilled teachers. As a people, we think now that \$2,000 is enough to invest in the education and bringing up of a child. Probably that sum is larger than the average amount used in bringing our children to the age of maturity. When we are willing to expend \$10,000, or more, per child (the money being used in a judicious manner) we shall see a change for the better in regard to our children, far greater than we have seen in the past fifty years in regard to race horses.

Men and women of marked ability as teachers are not now attracted, as a class, to this profession by the income to be obtained, but rather by the opportunities offered to do good to their fellow beings. Many such teachers feel obliged to leave this work to take up some other that is more lucrative. Thus our children are made to suffer on account of the general desire to heap up more riches rather than pay such skilled workers liberally.

But, in my opinion, if we as a State would provide all that is necessary to give to every child a good education, such as would properly train his physical, mental, and moral being, the time would soon come when we would need no more taxes than we collect now. The better education, teaching that labor is honorable, and that each one should have some honorable occupation; that a morally upright mind, in a comparatively healthy body, is a treasure above price and obtainable by all. Such an education would soon bring to a minimum all the present enormous cost of providing for transgressors against law and order. How much better it would be to save by proper training through childhood and youth, than to repress in after years by the bars and walls of the common jail.

Not having had any experience in teaching in a school where manual instruction is used, I cannot state any definite plan for carrying on such instruction. That is something which can be determined in no other way than by careful trial. What should be done in this way and how, would depend greatly on the community in which the school is placed. All schools should have some common subjects of instruction, and then, besides these, they should have such ones as are best fitted to prepare pupils for the business life of their part of the State, or for such occupations as they might show themselves peculiarly fitted to enter upon. I do not mean by this that trades, etc., should be taught in the public schools; but that the training should be in accordance with some definite purpose or end, just as soon as the child shows any decided ability or inclination towards any particular business or occupation.

In order to have any number of teachers prepared to give instruction properly in manual training, there should be a college attached to the State University, in which young men and young women could take a course of instruction that would fit them to become teachers of such courses as may be found necessary for the public school. The course of instruction in this college should be such as would prepare students in four years to teach all the higher branches, as in high schools or high grammar schools, and also to become superintendents of a full course of instruction, from primary to high school, including some system of manual instruction. When it was found that one college could not supply the demand for such instruction of teachers, similar courses could be given in connection with the State Normal Schools. So, in course of time, by careful trial and gradual advance in the methods of preparing teachers, a sufficient number of skilled teachers could be trained, without costly failures on the part of the State, to carry on our schools in ways far better than are now in use. For such improvements all right thinking persons will ever pray.

Respectfully yours,

C. B. TOWLE.

Does not think manual training necessary in country schools:

SAN RAFAEL, January 13, 1888.

JOHN J. TOBIN:

DEAR SIR: *First*—I favor industrial training in the public schools of the cities and large towns. I do not think it necessary in the country schools.

Second—It is difficult to tell what the scope or extent of this training should be. This can only be determined by experiment. I think every boy, at least, should be so trained in the public schools that when he leaves school, at sixteen or seventeen years of age, he should be able, without further apprenticeship, to enter some one of the industrial pursuits and make a living. The best way to drive out the Chinese is to teach our boys to work. They can best be taught this by teaching them how to work.

Very truly yours,

C. S. SMYTH,
Principal of San Rafael School.

Books are mighty levers, but bread is necessary:

SAN FRANCISCO, May 30, 1888.

JOHN J. TOBIN:

SIR: I am not qualified to give that "full, free treatment" of the subjects involved, which Circular No. 4 invites and importance demands.

Still, I say this much, that I am in favor of industrial training as a part of the public school system of the State.

I favor it because I saw its helpful influence upon the youth of St. Louis and Boston, and particularly upon the orphans of Girard College. That education is the best which fits a man to enjoy life and aids him to support himself and family.

Girard College, Philadelphia, is a model school, where many trades are well taught and character developed without scholarship being neglected.

Books are mighty levers, but bread is necessary. The pedant who rails at the almighty dollar and sneers at the accused greed for lucre is not half right.

The pupil of our public school who has never earned a dollar, nor learned its true value, has neglected an essential part of a sound business education.

S. A. WHITE,
V. G. School.

Better work would be done in the schools with a system of industrial training introduced:

NEVADA CITY, February 25, 1888.

Hon. JOHN J. TOBIN:

DEAR SIR: Yours of the sixteenth ultimo is just at hand. In answer to question one, "Do you favor industrial training as a part of the public school system of this State?" I will say yes.

First—I believe that better work, or at least as good work, would be done in the schools with a system of industrial training introduced as is done now without it. It is well known that a certain amount of muscular labor is necessary to a healthy growth of the mind.

Second—It would teach the boys and girls to work, which would be a strong help toward breaking down that growing sentiment in our country, that labor is not altogether respectable.

Third—That sort of training will assist the boys, while young, to know what they are best adapted to pursue in life. A large part, as well as the best part, of the life of a very large number of boys and young men is wasted in finding out what they can do successfully.

Question two: "What, in your opinion, should be the scope or extent of this training?" To teach the rudiments or elements of trades, mechanics, draughting, drawing, engraving, etc., should be the scope of the work. It seems to me, that the practical application of this scheme can only be wrought out in the larger schools of the cities and large towns.

A. J. TIFFANY,
County Superintendent.

There is little enough time for studies already in our school course:

CRESCENT CITY, April 3, 1888.

Hon. JOHN J. TOBIN, Labor Commissioner:

DEAR SIR: I am not in favor of "industrial training as a part of the public school system," if it is to take from the time or importance of mental work.

In the growing desire to be intensely practical, we are fast losing sight of the efficacy of study as a source of mental power. But I also realize that, owing to the selfishness and short-sightedness of parents, there is need of a manual training school, but I would have

it separate from the general school. We seem to have little enough time for studies already in our school course.

In this county there is opportunity for the boys to learn whatever trade is called for in this section. But in densely populated sections, where trades are so managed as to exclude *our own boys*, apparently to make room for foreign *men*, it would seem that some arrangement should be made whereby our youths could fit themselves to earn a living. To accomplish this end would require more time than can be afforded in connection with the ordinary schools, and as children generally become more interested in what they can see actually growing under their hands than in abstruse study, I fear the ordinary mental discipline of connected study would be sadly weakened. As to the extent or scope, I hardly know what my opinion is, only that in general I prefer to have a limited extent well known than a larger field superficially gone over.

I remain,

SARAH G. WRIGHT,
Superintendent of Schools of Del Norte County.

Favors special schools for industrial training which should be auxiliaries to our other public schools:

SAN FRANCISCO, —, —.

In reply to your circular received a few days since, I would say, I do favor industrial training as a part of the public school system. I do *not* advocate this as *supplanting* anything now taught, but rather as *supplementing* our work. Many who favor industrial training *underestimate* the value of mental training, which, *in my opinion*, is a great mistake. Nothing is truer than that "brains will tell" in any avocation; therefore, the mental training is an important factor in making superior artisans. Hence, I would have special schools open to *both boys and girls*, for industrial training, with teachers thoroughly skilled in the crafts taught. In these schools, instruction should be given in modeling in clay, wood carving, freehand drawing, joining, sewing, etc.

I would also have manual training schools, open, upon examination, to pupils who have finished the grammar school. Here, the boys and girls should have, in addition to a thorough course in drawing, language, mathematics, and science, instruction in the *nature* and use of tools, and in their application to the chief materials used in the world's industries. There should be a prescribed course in these, as in other schools.

Industrial training should be so incorporated as not to interfere with work already established, and should be so managed as to be an incentive to better and more thorough mental work. Such schools should be *auxiliaries* to our other public schools. They should *not* take their place. We need *both*; and, while the hand should be trained and a way thus prepared to forestall and prevent the "mischief," which the "spirit of evil finds for idle hands," the mental growth should not be stunted; the mind of the child should be developed, his knowledge broadened, his ideas enlarged, for in this way only will he become a deft and skilled handicraftsman.

By the complete education of the mental, moral, and physical powers, we may be able to send out from our schools men and women who shall do the world's work in the noblest and best manner possible. With *such* educational facilities, and *such an education as these would afford*, hoodlumism would become a thing of the past, and the work of our Police Courts and prison officials materially lessened.

Very respectfully,

E. A. CLEVELAND,
Principal Rincon Grammar School.

OPPOSED TO MANUAL TRAINING IN PUBLIC SCHOOLS.

The business workshops of the towns and cities are the best places for boys to learn to be successful artisans:

SAN FRANCISCO, January 19, 1888.

Hon. JOHN J. TOBIN:

DEAR SIR: In reply to your Circular No. 4. I have to say that I am not in favor of industrial training as a part of the public school system of this State, for the following reasons:

The public, when offered industrial instruction, have not taken advantage of the free education which has been tendered to them by the Government, or by the munificent donations of private individuals.

We have a Department of Agriculture in connection with the State University, where free instruction is given to the youth of our State in the practical working of our soils, yet I am informed that less than one half dozen pupils out of the million of people in our State are regular students in this department.

The same want of interest and desire to receive instruction in industrial training in the Mining Department of the University is shown, by the small number in attendance.

When Superintendent of Public Schools of this city, I gave considerable attention to industrial training in connection with our School Department. After earnestly investi-

gating the subject, I was forced, against my first impressions upon this subject, to come to the conclusion that the public school room is not the place to drill the young tyro in practical mechanics.

I think that wherever this system of instruction has been tried it has not met with that success which its most enthusiastic advocates could wish.

In my opinion the business workshops of the towns and large cities are the best places to teach our boys to learn to be successful artisans.

I am in favor of technical instruction in our public and private schools, to the greatest possible extent. Such technical schools as the Cooper Institute of New York have done much to advance the best interests of the young student who is struggling to master all that he can from the books, and from the instruction of his teacher, to become a successful artisan.

I have great hopes for the success of the technical school which is to be founded in this city by the munificence of Doctor Cogswell, but I fear that the workshops which he proposes to establish for the practical drill of pupils in the mechanic arts will not meet with that success which its founder so earnestly desires.

Respectfully,

JAMES DENMAN.

The opinion of Professor Denman is entitled to great weight, although he stands almost alone, among those responding to my circular, in opposition to manual training in connection with our public school system. He was formerly Superintendent of Schools in San Francisco, and is held in high esteem among the educators of the State. He favors such training, however, in schools like the Cogswell Polytechnic College.

Professor T. O. Crawford, Principal of the Crawford Manual Training College of Oakland, gives his views, based upon experience, of the working of the system of manual training in connection with our public school system:

OAKLAND, August 22, 1888.

Colonel J. J. TOBIN:

DEAR SIR: I am glad to answer your questions and give you my views on industrial education and manual training among the boys and girls of a grammar school age, from eleven to fifteen. I do this the more gladly, in that my judgment is based upon experience in the shop and in the class room for more than two years, with, during that time, more than one hundred and twenty boys of the above ages.

Believing that a better mental development (better, in that it was many-sided and symmetrical) could be attained by using as factors the eye and the hand along with the brain, I commenced agitating the establishment of a manual training department in connection with the grammar school department of the Lincoln Grammar School in Oakland.

On the Board of Education at that time were men who were heartily in favor of the proposed plan. The Superintendent at that time, J. C. Gilson, gave the weight of his influence in our favor, and ably seconded the efforts of Hon. W. H. Jordan, A. W. Bussell, E. B. Clement, and the others who were favorable to our undertaking. Our plan was so far matured that in April, of 1884, we procured twenty sets of carpenter's tools, utilized a shed for a shop, and commenced work. Our classes were arranged as follows: Four classes of twenty boys were formed and placed under the care of the principal (myself) and of the department mechanic, Mr. Bell. The first class worked from 8 A. M. till 10 A. M., on Mondays and Wednesdays, the second class from 8 A. M. to 10 A. M., on Tuesdays and Thursdays, the third class from 2 P. M. till 4 P. M., on Mondays and Wednesdays, and the fourth class from 2 P. M. to 4 P. M., on Tuesdays and Thursdays.

It will be seen that by this plan each boy gave of his own time two hours per week and took from the school time a like amount. This plan was adopted in deference to some, who were afraid that the whole four hours a week taken from the twenty-five hours, the whole amount of school time per week, would be too large a proportion for manual training. During the latter part of my two years and three months' experience with these classes, the whole four hours was taken from the ordinary school time. By this plan it will be seen that eighty boys from the first (the highest), second, third, and fourth (the lowest grammar grade) were in the manual training department. It will be in order now to give the results of the experiment, considered from many standpoints.

1. The standing of the boys in their class room work. It was, on the average, as good as the average work of the remaining pupils. Some of the boys worked better before entering the training class. It was easier for the teacher to control the boys and to have them perform their class room work, since, if a boy neglected his ordinary class room work, he was not allowed to remain in the shop.

2. Standing in general knowledge much higher than their classmates, as every lesson at the bench was preceded by a lesson pertaining to the material or thing used.

3. Habit of observation instituted in some cases for the first time—in all cases strengthened and made more accurate. The real use of the eye as the gateway to the soul was, in my case, first understood.

4. Power of seeing accurately developed amazingly. Lines and angles produced, recognized, and correctly named. Form developed, and the power to read and imagine the thing from its lines.

5. Cultivation of the power to carry the hand along a given line, thus insuring accurate work.

6. Increased power to concentrate the attention, and a consequent increase of work done in a given time.

7. Cultivation of power of comparison of forms and intelligent power to select the best.

8. Cultivation of habits of neatness and order, as all benches must be kept clean, and tools in proper places.

9. Inculcation of habits of economy. The best way of cutting material, so as to save material, taught and enforced.

10. Habit of doing a thing just right, without guess or slop work.

11. Habit of being busy at all times.

12. The dignity of labor, not as work, but as a factor in production, insisted on.

One of the lessons learned was that honest hand labor is as commendable as mental work. The boy thought most of in the shop was the best workman.

I can state from careful observation, that there were no bad effects growing out of our workshop; on the contrary, everything was made better by the introduction of manual training.

T. O. CRAWFORD,

Principal of the Crawford Manual Training College, Oakland, Cal.

OPINIONS OF MECHANICS.

It was found difficult to get an expression of opinion from mechanics, as the subject was new to them and they had not given it sufficient thought to hazard an opinion. Mr. Bushnell, late President of the Council of Federated Trades in San Francisco, whilst favoring manual training in our public schools, expresses a fear that political considerations would interfere with its success. Mr. Jorgensen, of the Furniture Workers Union, thinks the State should establish workshops:

SAN FRANCISCO, February 28, 1888.

J. J. TOBIN, *Esq.*, *Commissioner State Bureau of Labor Statistics*:

DEAR SIR: In referring to your circular of twenty-sixth ultimo, permit me to say that I shall answer most heartily in the affirmative to question one.

As to the scope or extent of this training, it would seem to me that, if *properly* and *honestly* fostered, the effort could hardly go too far. But so much depends upon the auspices under which this training should be conducted, and the system of school management being so changeable and so much controlled by political considerations, it would also seem to me best that great caution be exercised in putting such a course into practical operation.

Very truly yours,

W. A. BUSHNELL,

President Representative Council Federated Trades and Labor Organizations of the Pacific Coast.

SAN FRANCISCO, —, —.

Hon. JOHN J. TOBIN:

DEAR SIR: In answer to your circular permit me to make the following statement: I am heartily in favor of industrial training as part of the public school system, and I think the State ought to establish workshops in connection with free schools for children over fourteen years of age. The children should under no circumstances be allowed to work more than eight hours per day; all goods produced by these shops should be sold in retail to the public at the regular market price; and all income from this institution be paid to the young wage earners. They should have a right to work in such shops until their twentieth year of age.

Yours respectfully,

P. JORGENSEN,

Member of the Furniture Workers Union.

In an interview with a reporter of the San Francisco "Daily Report," Mr. Hamilton H. Dobbin, Secretary of the Federated Trades, speaking of the value of technical training schools for boys, said:

I can't speak from a builder's standpoint, for no class of builders are represented in the Federated Trades. None of the carpenters, plumbers, painters, or bricklayers are mem-

bers of that central organization. However, it was only a few days ago that some of those practical mechanics and I were discussing this very subject. They were of the opinion that such a school would furnish more thorough plumbers, carpenters, frescoers, etc. They told me that it was hard to get enough workmen skilled in the several branches of a trade. There were plenty of bright men in some lines, but their training had not been general and evenly. Trained men were in demand. Notwithstanding this demand there were always plenty of botches to be found, and they brought down wages of course. I think, said Mr. Dobbin, that for builders, such a trade school would be practicable and highly advantageous. But for many other trades it would be useless. For instance, in the shoemaking business. Look around me and what do you see? Every man doing one special piece of work. One man is making tops, another sewing, another soling, another heeling, and I am tacking. There was a time, before all this machinery was introduced, that my partner and I used to make shoes complete, but now every man makes a little. In this way one does not have to know how to make a whole shoe. In three months' time he can learn how to do his line of work as fast as his predecessor, and then the faster he works the more money he makes. A technical knowledge of the shoemaking business in general wouldn't do him any more good than geography would for making shoes. It might be a satisfaction to him as a study, but it would not enable him to make a cent more or be a bit more useful to his employer.

Mr. Henry T. Bush, of the firm of Bush & Mallét, plumbers, speaking of the Auchmuty Trade School, of New York, said:

The school, as run in New York, is certainly successful and one ought to be established here. Our great drawback is that we cannot get thorough plumbers. The boys come to a shop and wish to learn the trade of plumbing and gasfitting. Even if they staid two or three years they would not get as thorough training as they would under the trade school plan in a few months, but oftentimes they don't stay long enough in one place to learn anything thoroughly. They get so tired of the sameness—of not learning something new every day—that they accept with avidity an offer from any other shop for 25 cents a day more. Thus they flit from shop to shop, and at the end of the time which it takes a careful and steady young man to make a good plumber they are really tinkers only. The boss plumbers have individually thought much of the school plan, but our organization has been so busy fighting for the plumbing ordinance that we have as yet had no time to take concentrated action. We would gladly support any scheme of the kind, and the journeymen plumbers, I feel certain, will throw no obstacles in the way of any plan to make better workmen and keep up wages by weeding out poor ones.

From painters and bricklayers the reporter got similar answers with reference to the present superficial knowledge of a large number of the so called journeymen, and it was the unanimous opinion that a trade school, which should teach such branches, to be followed up by necessary practical experience, would not only be a blessing to the tradesmen, but to their patrons also.

Mr. A. Jackson, President of the Builders Association of San Francisco, said that "if New York and Philadelphia can make a success out of technical or trade schools for boys, there is no reason why San Francisco, with its accustomed enterprise, should not do likewise," and he proposed to bring the subject up at the next meeting of the association.

OPINIONS OF MECHANICS IN ANOTHER CHAPTER.

In the chapter on trades unions and labor organizations, under the heading of "Remarks from Workingmen," the opinions of many workingmen on this subject will be found.

BOYS AND GIRLS AID SOCIETY OF CALIFORNIA.

SAN FRANCISCO, January 28, 1888.

Mr. JOHN J. TOBIN, *Labor Commissioner*:

DEAR SIR: In reply to your circular, received some ten days ago—and this is my first opportunity to attend to the matter—I send you herewith inclosed a copy of my address on "Formation Rather than Reformation," at the recent Conference of Charities, which gives, in a general way, my views on the two questions contained in the printed circular. Beginning on page five, I think I have anticipated, in that address, both of your questions.

I do most emphatically favor industrial training as part of the public school system of this State, and think it should be recognized in the methods, more or less, from the beginning of our lowest grades up to the grammar or intermediate school, in which I think fully one half the time of the schools should be devoted to industrial training. I have dwelt upon this matter quite definitely in the short paper inclosed, and need not say more in my letter. I shall be happy to give you any assistance that I can in these investigations.

Very truly yours,

E. T. DOOLEY,
Superintendent.

The following able paper on "Technical Training for Teachers" was read before the Teachers State Convention at Berkeley by Mr. Joseph O'Connor, and is well worthy of careful study:

TECHNICAL TRAINING FOR TEACHERS.

By JOSEPH O'CONNOR, Principal Valencia Street Grammar School, San Francisco.

Jules Simon says, "Among all nations the direction impressed upon education depends on the idea which they form of the perfect man." It seems plain, therefore, that our schools must soon learn to train the hand as well as the head; that is, if our young business men are to compete successfully against the graduates of the European technical schools. This fact has already gained recognition in many private institutions of learning, but I believe the time is fast approaching when the country will deem it expedient to follow the example of France, England, Switzerland, Germany, Russia, etc., by establishing public technical schools or technical instruction in already established public schools.

These changes will certainly cause a remodeling of our educational system, which can only be accomplished with ease through the agency of specially trained teachers under the direction of competent supervision.

The present seems to be a period of transition and of unusual energy in educational development. But two or three hundred years ago the very few who could read were considered wonderfully accomplished. Gradually mathematics, languages (chiefly ancient), chemistry, geology, and physics have been added to the list of studies. It must not be forgotten, however, that this instruction has been and is almost entirely theoretical, and hence that school now called good, because they succeed well in what they attempt, will be considered poor indeed when they come to be tested by the practical application of their teachings to the arts, and industries, and business methods of the bread-winning world.

In the theoretical teaching which we seem to have inherited, our schools are good, and they are so in spite of the errors to which I have referred; but with these mistakes corrected, the instruction would be much improved. The necessary practical knowledge is now acquired, after the pupil has left the school, by dearly bought experience. This feature of education must, as far as possible, be brought into the schools. The pupil must be taught to apply the principles, heretofore conveyed at second hand through books, to the things of real life, instead of being permitted, as at present, to start his apprenticeship with principles behind him, and a hard practical world, in which every mistake implies a loss, ahead of him.

I believe I was the first teacher of California to call public attention, through one of my reports while Deputy Superintendent of Schools of San Francisco, to the necessity for a change in our educational system to meet the demand for what is known as technical instruction. I believe, also, I was the first to suggest the scheme of the Cogswell Polytechnical College—not to the founder, himself, but to those who presented it to him.

Any person who reads such works as Stetson's "Technical Education," or McArthur's "Education in relation to Manual Industry," will see what the Governments of Europe and the private individuals of the United States are doing for the simultaneous education of the hand and head. It is high time that the Government, the Universities, and the Normal Schools should start forward with one accord to fit our teachers to give our children such an education as will make them skilled artisans and practical scientists—able not only to compete with but to outstrip all the nations of Europe in trade, manufacture, and commercial enterprise.

I believe that Congress would do well to use a portion of the nation's surplus revenue for the establishment of one or more technical training schools for teachers. The great want of this country is trained teachers. The object of this training in art and industry, known as technical education, is to enable us to compete with nations. It seems clear, therefore, that with us, as with European countries, the project should be as much an affair of the nation as the army, or the navy, or commerce. It also seems clear that we should lose no further time about following the example of England, France, Germany, and Switzerland, by establishing technical training schools, where teachers may be trained to give our youth the instruction, which, in time, will enable them to bring within our borders the numerous foreign industries, to the support of which we now contribute so largely, and which, through the development and utilization of our unequalled natural wealth, will enable us, not merely to compete with, but to outstrip the nations of the earth in the development of wealth, happiness, and the highest civilization, while, by making the means to these ends the heritage of all, we throw a bulwark around our liberties, which neither plutocracy nor corruption can ever break down.

OPINIONS OF DISTINGUISHED MEN AND MEN OF BUSINESS ON MANUAL AND TECHNICAL TRAINING.

The following extracts from testimony given before investigating committees, and from papers read before public meetings, furnish evidence of the current of opinion on manual and technical education everywhere. They deserve to be carefully studied, for they emanate, mostly, from men of world-wide reputation:

United States Investigating Committee. William Steinway, the great piano manufacturer, New York, testified:

Our firm employs over one thousand men. A great evil under which this country is suffering—and it seems to me it is an evil increasing from year to year—is, that in no country of the world, as I have found during my experience and my extensive travels, are there so many young men growing up without learning a trade or any particular calling, as in the United States.

We have no apprentice law. In our own business, as well as the wood working business, everybody is unwilling to take an apprentice, for the simple reason that it is a well known fact that the first year or two, when a boy is learning a trade, he will produce nothing, and will spoil a great deal, and will take up the time of a skilled man to teach him, and yet the moment he has learned one little branch of the trade he leaves and shifts for himself. He has not learned the business properly, and the consequence is that he is dependent, and in times of great depression cannot find employment.

Hence we have no supply of skilled artisans growing up, and have to draw for our extra skilled workmen on Europe. Through the wants of an apprentice law, seven eighths of the workmen in the piano shops in New York, and over one half in the New England States, are German.

The total want of industrial schools is another very great evil. There ought to be industrial schools all over each city, where boys can go and find for what business they have aptitude and talent. Then, under regular apprentice laws, under which a boy could be bound for, say, five years, at rising wages, commencing, say, at \$3 a week for the first year, \$3 50 for the second year, \$4 for the third, and so on, they would learn a trade well. During the last two or three years the employer would have the advantage of his labor, which during the first one or two years he lost.

Do away with the curse of American mechanics—young men learning only a portion of a skilled trade, and being absolutely dependent upon that, because they do not know anything else.

Question—Do you think the training of our people in industrial schools likely to produce an overstock of skilled labor in this country, and thereby reduce the wages of labor? Answer—I think it will not. The country is taking such strides in population and wealth that the addition of the skilled laborer, who would become such by the establishment of apprentice laws and industrial schools, would simply go on, without any perceptible effect. But the principal thing is that our American boys, as they grow up, ought to be taught to learn a profession or trade, and be independent.

That is what I find nowhere in the wide world so much neglected as here; nowhere are there so many young men who have not learned anything in particular, as there are in this country, and yet they are the most intelligent in the world.

John W. Britton, firm of Brewster & Co., carriage manufacturers, New York, testified:

We employ over five hundred hands, four hundred of whom may be called skilled mechanics. Look at the mechanic and laboring man to-day, and under the condition of our social affairs what sort of a wife can he get? Girls have no opportunity whatever to have any domestic training. If she had been to a public school she is taught nothing that is really useful. Let us have less piano and more practical education of women and girls. Let a girl be taught, at the public expense, if you please, how to darn a stocking and how to sew on buttons. Let them learn to cook, and to do these things well. In London they are taking up that subject seriously, and are attaching to their public schools cooking and sewing schools, so that girls may have some knowledge of the duties of wives and mothers. If girls have no early training themselves, they do not know how to train their children.

Let me right here say a word about the difficulty we have in getting apprentices. The American is getting to look upon mechanical labor as somewhat detrimental to his liberty. If a boy has any ability he looks upon a trade as so much lost time. He wants to be a merchant, a broker, a banker, or a professional man. They want rapid transit to a fortune and will not wait. Every distinguished foreigner who comes to this country is paraded around among our public schools, and we talk to these foreigners about the beauties of our public schools, and we give "tuff" to our school principals, and everything looks glorious, but the fact is that it is disgusting to a man who knows anything about it.

I was chairman of a committee of the Carriage Builders National Association, who prepared and issued the following address:

"To officials and official bodies in the United States having the supervision of public education:
"The Carriage Builders National Association of the United States, in behalf of the industry represented by them and other mechanical industries of the country, beg leave to call your attention to the necessity of some change in the course of study in our public schools, which will prepare those who intend to become apprentices in trades and mechanical pursuits requiring a high standard of taste and skill. Very few of the pupils who attended the public schools of this and other cities have had any instruction in free-hand drawing and practical geometry, so necessary to all who wish to engage in the higher mechanical pursuits. At present we are dependent in a great measure upon artisans educated in their trades abroad, but the number of this class seeking our shores for employment is lessening every year. The lack, too, of any well established apprenticeship system in this country precludes any relief in the near future from that source. We, therefore, deem it highly important to reinforce the ranks of mechanics by a system of public school education which shall earlier fit boys to enter into trades, with some assurance that their preparatory studies are likely to assist in making them intelligent and skilled workmen.

"William D. Rogers, Pennsylvania; Chauncey Thomas, Massachusetts; Lowe Emerson, Ohio; W. N. Fitzgerald, New Jersey; Wilder H. Pray, New York; Geo. W. W. Houghton, New York; John W. Britton, Chairman."

In the kindergarten school, as soon as little children are able to toddle, a slate and pencil are put into their hands and they are taught the rudiments of drawing. I would make every boy and girl who received a public education learn to draw. In this country, the mechanic should be the superior in working power over the mechanic abroad. But compare him with the Frenchman. The Frenchman is instinctively an artist. He may only be a laborer, but he has the intuitions of an artist. Why is it that Paris supplies the world with things of beauty? Because for fifty years past the French Government has seen to it that the people got that sort of an education which would make them more efficient and make them earn more for themselves and for the nation. London is now waking up and following Paris. In Germany, the Government believes that it is under a moral obligation to look after the interests of the workingman.

If a boy understands something of the principles of geometry and has done something at free-hand drawing, even in a rude way, when he comes into our workshop to learn a trade it is equivalent to two years' experience for him.

The kind of education that our boys want is not a classical education. I believe that the average boy who is sent to acquire a classical education is ruined by the time he gets through with it.

France, with her technical schools, has taken away the carriage trade from London.

Senate Investigating Committee. Charles F. Wingate, Sanitary Engineer, New York:

There should be some modification of our public school system of training, so that while there should not be a regular industrial course in the day school, yet the subject of drawing, for example, should be taught just as much as writing. The evening schools should be turned into industrial schools. Cooper Institute is so crowded with applicants that they have to turn away thousands every year.

In Hoe's printing establishment they have some two hundred boys, who are required to stay down two evenings in the week during the winter and receive regular instructions in reading, writing, drawing, and other technical knowledge. The firm pays for the boys' supper, but makes it compulsory for the boys to come.

Senate Investigating Committee. Richard J. Hinton, journalist, New York:

Nearly ever educator to-day, so far as I know, objects to the idea of the public schools being made a vehicle for teaching trades.

I think myself such an objection is an entirely valid one. Industrial education should be an education in the principles and applications in a general form which control the particular trade or occupation. After passing beyond the primary, secondary, and grammar school, where the pupils wanted to go to the high school, instead of studying what the old teachers called the "humanities," and what we call the "accomplishments," the high schools in all cities should be so divided that a boy who was going to sea should be taught navigation, and a boy going to learn a trade should be taught drawing and all the scientific knowledge which could be practically applied to his pursuit.

He need not and should not be taught to put plaster on walls, or take a stone out of winding, as the masons call it when they square one, or to lay bricks in courses, and so on. In France you will find industrial schools scattered all through the country, while in Paris that which is equivalent to our patent office is made the basis of instruction free for the artisans of that city who choose to avail themselves of it. In Belgium the entire country is overrun with special technical and trade schools, and so in Switzerland, and largely so in Germany.

Senate Investigating Committee, New York. Joseph Medell, publisher of the "Chicago Tribune."

I next come to the educational system of this country as bearing on the labor question. I refer to the high school and college system of teaching. Our college system certainly does not train our youth in habits of useful industry; its purpose is not to increase the effectiveness of labor, to make two blades of grass grow where only one grew before; it does not show the pupil how, by acquiring a manual art, he can double or treble the value of his labor. It does not teach art or science in a practical form.

On the contrary, college education is conducted with a view to imparting a knowledge of dead languages and higher mathematics to the pupils, which is all well enough for the wealthy and leisure classes, but is not suited for bread winners. These academies attract hundreds of thousands of our youth, whose purpose is to acquire the art of living by their wits and avoiding manual labor; this, too, is the purpose of their parents in sending them to such schools. These academies have flooded the professions with men destitute of natural capacity for them, and have swollen the ranks of office seekers, gambling speculators, and professional sharps, who subsist by preying upon the rest of the community. This American system of education has destroyed all desire upon the part of youths to learn trades and become honest artisans, and it has crowded the ranks of the middlemen with searchers after genteel employment at wretched wages. Multitudes of farmers and mechanics sons seek to be salesmen, clerks, bookkeepers, drummers for trade houses, and failing to find or retain such situations, they become "sports," billiard markers, bartenders, confidence men, dead beats, anything in short but hand-soiling workmen. With the exception of a few special branches of industry, Americans have surrendered the mechanical fields to foreigners, and when more artisans are needed they are not trained here, but are imported as we import our merchandise. This is all wrong. It is a cruel injustice to the rising generation of Americans and a source of weakness to the body politic. Every institution of learning should, in my judgment, teach art practically. Every college should have a department of mechanism and a chemical laboratory to impart the secrets of nature and the sources of force. We need industrial schools in every city, where the youth can learn trades that will equip them for the struggles of life and increase the power and productiveness of their labor, and elevate it in the eyes of the rising generation. They must be taught to respect, rather than despise industry, and to hold working bees in higher estimation than the drones in the human hive.

Of the present American mechanics the enormous majority of them are of foreign birth, and they prefer, when there is a vacancy, to send for a brother, cousin, or chum of their own in the old country if a mechanic; and so they secure places for them and limit the places which might be had by Americans, and in that way they keep the Americans out.

Another trouble is that the "bosses," as the proprietors are called, do not like to be bothered with apprentice boys, and do not want to give up the time of their foremen to teach these boys. They prefer importing ready-made mechanics from Europe. They prefer to have men that already know the trade than to be bothered with teaching boys for three or four years the art they are working at, so that between the disinclination of the proprietors to incur the trouble of instructing boys and the hostility of the trades unions to Americans getting into the trades, our boys are squeezed out. Then there is a vicious idea, taught in families among the American people, that it is not quite respectable to follow any vocation that soils the fingers or the shirt cuffs, and the mothers, as well as the fathers, like to have their sons go into what are called "genteel employments," even if they are beggarly paid. The dignity of labor is not held up at all, and mechanism is not held in the respect that it ought to be in this country. For my part, I look upon the mechanic as being about the best man to be found next to the farmer. I regard the farmer as the first.

PROFESSOR HUXLEY ON TECHNICAL EDUCATION.

The following is from an article written for an English review by the celebrated scholar and thinker, Professor T. H. Huxley:

A vast system of elementary education has now been in operation among us for sixteen years, and has reached all but a very small fraction of the population. I do not think that there is any room for doubt that, on the whole, it has worked well, and that its indirect, no less than its direct, benefits have been immense.

But, as might be expected, it exhibits the defects of all our educational systems, fashioned as they were to meet the wants of a bygone condition of society. There is a widespread, and I think well justified, complaint that it has too much to do with books and too little to do with things. I am as little disposed as any one can well be to narrow early education and to make the primary school a mere annex of the shop. And it is not so much in the interests of industry as in that of breadth of culture that I echo the common complaint against the bookish and theoretical character of our primary instruction.

If there were no such thing as industrial pursuits, a system of education which does nothing for the faculties of observation, which trains neither the eye nor the hand, and which is compatible with utter ignorance of the commonest natural truths, might still be reasonably regarded as strangely imperfect. And when we consider that the instruction and training which are lacking are exactly those which are of most importance for the

great mass of our population, the fault becomes almost a crime, the more that there is no practical difficulty in making good these defects.

There really is no reason why drawing should not be universally taught, and it is an admirable training for both eye and hand. Artists are born, not made; but everybody may be taught to draw elevations, plans, and sections; and pots and pans are as good, indeed better, models for this purpose than the Apollo Belvedere. The plant is not expensive; and there is this excellent quality about drawing of the kind indicated, that it can be tested almost as easily and severely as arithmetic. Such drawings are either right or wrong, and if they are wrong the pupil can be made to see that they are wrong. From the industrial point of view, drawing has the further merit that there is hardly any trade in which the power of drawing is not of daily and hourly utility.

In the next place, no good reason, except the want of capable teachers, can be assigned why elementary notions of science should not be an element in general instruction. In this case, again, no experience or elaborate apparatus is necessary. The commonest thing—a candle, a boy's squirt, a piece of chalk—in the hands of a teacher who knows his business, may be made the starting points whence children may be led into the regions of science as far as their capacity permits, with efficient exercise of their observational and reasoning faculties on the road. If object lessons often prove trivial failures, it is not the fault of object lessons, but that of the teacher, who has not found out how much the power of teaching a little depends on knowing a great deal, and that thoroughly; and that he has not made that discovery is not the fault of the teachers, but of the detestable system of training them, which is widely prevalent.

As I have said, I do not regard the proposal to add these to the present subjects of universal instruction, as made merely in the interests of industry. Elementary science and drawing are just as needful at Eton (where I am happy to say both are now parts of the regular course) as in the lowest primary school. But their importance in the education of the artisan is enhanced, not merely by the fact that the knowledge and skill thus gained—little as they amount to—will be of practical utility to him; but further, because they constitute an introduction to that special training which is commonly called "technical education."

I conceive that our wants in this last direction may be grouped under four heads: (1) Instruction in the principles of those branches of science and of art which are peculiarly applicable to industrial pursuits, which may be called preliminary education. (2) Instruction in the special branches of such applied to science and art, as technical education proper. (3) Instruction of teachers in both these branches. (4) Capacity-catching machinery.

A great deal has already been done in each of these directions, but much remains to be done. If elementary education is amended in the way that has been suggested, I think that the school boards will have quite as much on their hands as they are capable of doing well.

Technical education, in the strict sense, has become a necessity for two reasons. The old apprenticeship system has broken down, partly by reason of the changed conditions of industrial life, and partly because trades have ceased to be "crafts," the traditional secrets whereof the master handed down to his apprentices. Invention is constantly changing the face of our industries, so that "use and want," "rule of thumb," and the like, are gradually losing their importance, while that knowledge of principles which alone can deal successfully with changed conditions is becoming more and more valuable. Socially, the "master" of four or five apprentices is disappearing in favor of the "employer" of forty, or four hundred, or four thousand "hands," and the odds and ends of technical knowledge—formerly picked up in a shop—are not, and cannot be, supplied in the factory. The instruction formerly given by the master must therefore be more than replaced by the systematic teaching of the technical school.

Institutions of this kind, on varying scales of magnitude and completeness, from the splendid edifice set up by the City and Guild's Institute, of London, to the smallest local technical school, to say nothing of classes which have been established in various parts of the country, and the movement in favor of their increase and multiplication are rapidly growing in breadth and intensity. But there is much difference of opinion as to the best way in which the technical instruction so generally desired should be given. Two courses appear to be practicable: The one is the establishment of special technical schools with a systematic and enlightened course of instruction demanding the employment of the whole time of the pupils. The other is the setting afoot of technical classes, especially evening classes, comprising a short series of lessons on some special topic, which may be attended by persons already earning wages in some branch of trade or commerce.

There is no doubt that technical schools, on the plan indicated under the first head, are extremely costly; and, so far as the teaching of artisans is concerned, it is very commonly objected to them that, as the learners do not work under trade conditions, they are apt to fall into amateurish habits, which prove of more hindrance than service in the actual business of life.

When such schools are attached to factories, under the direction of an employer who desires to train up a supply of intelligent workmen, of course this objection does not apply; nor can the usefulness of such schools for the training of future employers, and for the higher grade of the employed, be doubtful; but they are clearly out of the reach of the great mass of the people, who have to earn their bread as soon as possible. We must, therefore, look to the classes, and especially to the evening classes, as the great instrument for the technical education of the artisan. The utility of such classes has

now been placed beyond all doubt; the only question which remains is to find the ways and means of extending them.

Supposing our intermediate science teaching and our technical schools and classes are established; there is yet a third need to be supplied, and that is the want of good teachers. And it is necessary not only to get them, but to keep them when you have got them.

It is impossible to insist too strongly upon the fact that efficient teachers of science and of technology are not to be made by the processes in vogue at ordinary training schools. The memory loaded with mere book work is not the thing wanted—is, in fact, rather worse than useless—in the teacher of scientific subjects. It is absolutely essential that his mind should be full of knowledge, and not of learning, and that what he knows should have been learned in the laboratory, rather than in the library.

Last, but not least, comes the question of providing the machinery for enabling those who are by nature specially qualified to undertake the higher branches of industrial work to reach the position in which they may render that service to the community. If all our educational expenditure did nothing but pick one man of scientific or inventive genius, each year, from amidst the hewers of wood and drawers of water, and give him the chance of making the best of his inborn faculties, it would be a very good investment. If there is one such child among the hundreds of thousands of our annual increase, it would be worth any money to drag him either from the slough of misery or the hotbed of wealth, and teach him to devote himself to the service of his people.

The following is taken from a valuable and interesting paper read before the Teachers State Convention at Berkeley, by Professor Joseph Le Conte:

HAND TRAINING IN THE PUBLIC SCHOOLS.

By Professor JOSEPH LE CONTE, of the University of California.

This subject, under the title of "manual training," has been much discussed of late, but mostly, both by friends and foes, under a misconception of its true function. It is urged by the people and by many educators, because of its supposed practical utility, that it is an apprenticeship to trade.

For that very reason, on the other hand, it is opposed by many of the truest friends of education. It panders, they say, to a false view of school education. Our schools, they say, and say rightly, are for general and not special culture, are mental training schools, not trade schools, are for making intelligent citizens, not tradesmen or artisans.

If this be the object of introducing manual training into the schools, then I wholly sympathize with the opposers. Why should our schools prepare for one pursuit more than another? Why trades more than professions or shopkeeping? By all means let there be trade schools, special schools of many kinds, if it be deemed necessary; but let them not be connected with our public school system.

But this is not the true object of hand work or manual training in the schools. The mistake here is the same as in the case of drawing. As drawing, if introduced, should be, not for making artists, but for training the brain through eye and hands, so hand work, if introduced, should be, not for making carpenters or blacksmiths, but to train the brain by coöperation of hand and eye. It is impossible to doubt the prime importance of hand training from this point of view. All admit the absolute necessity of the use of the hand in the brain culture of the child. All now admit, also, that the best scientific culture in university education require the use of instruments of research—the microscope, telescope, the balance, the measures of force of many kinds. But in the whole wide space between life in the school and the college, this great agent of culture is wholly left out.

Now, I am quite sure that for every grade of culture, whether of the individual or of the race, there is a corresponding grade of handwork necessary for the best brain culture. In the child of pre-school age, and in the savage, it is the simple use of the hand, or assisted by rude implements.

In the school boy or girl, as also in the next higher grades of races, it is by the use of those finer implements which we call "tools." In the university, as in the most civilized races, it is by the use of scientific instruments and machines. The three grades of hand work, then, are the use of implements, tools, and instruments. The one specially adapted, to the schools is the use of tools. But not only is hand training in the schools an immediate and very urgent want, but, by the increasing differentiation of human pursuits, and the increasing divergence of school life from actual life, is becoming more so every year. It cannot be put off long. There must be a return to natural methods.

In this separation of school methods from nature, and their final return, I see an illustration of a universal law running through all things human. Man must make his own possessions of all kinds, not merely inherit them.

We have forfeited by our artificial book methods that perfect nature culture which comes of coöperation of sense and brain and hand. The recovery, commenced by Pestalozzi and Froebel, is now continued in the movement for sense and hand training, and will still continue until our education is again wholly on nature. Such sweeping changes as those I am urging I know cannot be made in a day. It may be that country boys and girls will get much practice in hand use on the farm, and in doing chores about the yard, the stable, and the kitchen. But for our city boys and girls, what training of hand and eye can they get if not in the schools?

I insist, then, on the prime importance of hand training as well as sense training, the cultivation of the executive as well as of the receptive power, of the faculty of doing as well as of observing. As to the best form of hand work I say nothing. I leave that to those better acquainted than I with practical details. It is generally conceded, however, that different forms of tool work in wood and iron serve the best purpose. But let me insist again, for fear I should be misunderstood, that the prime object of such hand training is not its utility in the ordinary sense. Such utility may be and is no doubt a great advantage, but this is wholly subsidiary to the main object, which is mind training through hand work. School work at present deals so much with words and ideas, and so little with things. It is in many ways so different from natural child life that often there grows up an unconquerable repugnance to the school room. In some there results a still worse evil, viz., a complete submission to mechanical drill, a working of the mind only in ruts, and finally a loss of independent, spontaneous activity, and natural mode of working of the mind. So great do I think the danger that I am wholly opposed to early schooling, unless it be in the kindergarten. If there be any chance of culture at home, however desultory, I would not send a child to the public schools, as now organized, before twelve years old. We thus give a chance for healthy growth and spontaneous activity which cannot be easily quenched.

After this the rigid discipline of the school will have a most wholesome effect. Such a boy will lag a little at first, will find it hard to learn to work in harness, but soon he will distance competitors, especially in the higher education and in life.

The author of the following paper, Mr. H. Weinstock, of the large dry goods firm of Weinstock & Co., of Sacramento, has taken a practical interest in the question of industrial training and put it to the test in his own establishment. Boy and girl apprentices there are instructed daily by competent teachers in several of the branches usually taught in school, so that whilst the hand and eye are trained in the store the mind is not left uncultivated. He can therefore speak with authority upon the question of combining manual with mental training:

A PLEA FOR SCHOOL WORKSHOPS.

By H. WEINSTOCK, Esq., of Sacramento.

Not long ago the following news item appeared in a San Francisco daily paper:

"A STRANGE CRIME.—A MAN COMMITTED ARSON TO LEARN A TRADE IN SAN QUENTIN.

"A young man named John O'Brien accosted Police Officer Williams yesterday afternoon and said he wished to give himself into custody for arson. He said he had burned up about seventy-five railroad ties at the Peralta yards, in West Oakland. Investigation revealed the truth of his assertion, and he was locked up for safe keeping. He could offer no explanation for his strange act, in giving himself up, stoutly declaring that the arson had been committed with malice and forethought, and observing that he had never learned a trade, and if he went to San Quentin that defect might be remedied."

Absurd as this conduct may seem on the part of the man O'Brien, it has its influence in suggesting a line of thought to the writer, which has led to this essay.

The United States stands foremost among the nations of the world as a country devoted to the interests of education. This nation spends annually \$93,000,000 for education. It spends for education nearly three times as much as Great Britain, three times as much as Germany, and six times as much as France. It is the only country in the world that spends more for schools than for military and naval armaments. And yet the question is raised by many: "Is this money wisely expended?" Many able thinkers take the position that our public school system is harmful in its results; that the grading of pupils, as practiced in the public schools, is "most vicious." Such a system, they say, destroys individuality, the active mind is kept back and graded down to the mind of the average. They maintain that the system of grading may be compared with the barbarous custom said to have been practiced by a certain savage race, who buried its dead in coffins all of one size, stretching the bodies that were too short, and cutting down the limbs of those too long.

There are those, also, who hold that our public school system is harmful in its influences, because it educates vast numbers above their station and dissatisfies them with their lot, thus spoiling first class manual workers by making of them third class clerks and professionals.

As proof of these facts, they point out that comparatively few native born are engaged in the humbler pursuits or even in the trades, and that most of our domestic service and the greater part of our skilled and unskilled labor is performed by foreigners.

The purpose of this paper is not, however, to discuss the question as to whether we are over educated.

The writer sees around him too many proofs of the great good derived from our diffusive and liberal system of education to consider it an evil. He fully realizes that such of our native born as do engage in industrial and mechanical pursuits, by virtue of their liberal public school education, soon surpass the illiterate and poorly educated foreign mechanic or laborer.

Our public school system has been the chief factor in aiding the American artisan to become the most inventive and ingenious in the world. Much of our national wealth and power has come as a result of his brilliant inventions.

A writer in a recent magazine article truly says: "New inventions open new fields of labor. Take printing, take photography, take lithography, take gas making, take steam transportation, take all these fields of labor which have been positively created out of nothing by invention, and you will find that the man released from labor in some old occupation by the introduction of machinery which performs his work, enters some of these or other new avocations with increased pay for his labor."

I hold that the world is deeply indebted to the American inventor for his many wonderful and useful discoveries, and the American inventor is again deeply indebted to our public schools, their aid in developing his faculties. Thus our public school system has been the means not alone of adding to the comfort and convenience and profit of the people of this nation, but to all the civilized people on the globe.

We feel that we owe our public school system a debt of gratitude so great that we cannot, like the critics previously quoted, bring ourselves to condemn it, nor even to criticize, except it be in a most grateful spirit. The purpose of this paper, then, is not to tear down, but rather to recommend the broadening of the helpful influences of the schools of America.

To be too radical in advocating new measures is to throw aside the good which may be held fast in existing systems; to be too conservative is to fall behind in the van of progress.

We must, therefore, strive, while profiting by the new, to save all the good in the old. This thought applies most forcibly to education. Though our methods of instruction may yet be imperfect, our system of education, embracing, as it does, the primary, the grammar, the high school, and the university, is in its completeness in full keeping with the progressive spirit of the age.

A steady and regular school attendance should graduate a student from our State universities at the age of twenty-one. If his years have been wisely spent he should find himself well grounded in the studies that lie at the foundation of the higher callings, and though he may begin at the lower round of any of the professions, he should, by virtue of his years of mental training, be enabled to make speedy progress.

That he does not always do this must be admitted. This admission cannot, however, be looked upon as a reflection on the system. It indicates simply one of two facts. Either the student is unfitted for a profession by disposition, or by lack of talent; or if he is aware that he possesses only moderate abilities, the cause of his disappointment in failing to make headway in active life may lie in his not having realized beforehand that the lower rounds of the professional ladder have long been overcrowded, and that there is room in intellectual callings only for the more brilliant and the more talented.

The overcrowding of intellectual pursuits is sharply pointed out by the editor and proprietor of the oldest Boston society paper, who said to a well-trained writer: "Why should I pay your price? I run newspapers to make money, and there are any number of women on Beacon Street and Back Bay glad to send me work at \$3 a column to pay for their gloves, and plenty of young lawyers on Court Street willing to do the same to get something to eat." Thus the commentator on this item goes on to say, that "if that is what Harvard, and the higher education, prepares for us all, I fear we will come to think as contemptuously of clerks and students as any baron of the middle ages."

It is quite true that the liberality of our public school and educational systems tempt many to become aspirants for places in the higher pursuits, where fame and fortune are seemingly within easy reach—many who, from lack of mental strength, are unfitted to earn their bread except by their hands; and thus, in the language of those who condemn our educational system: "First class clerks and professionals are added to the already long list."

But it is also true, as already pointed out, that this very educational system has been the most potent influence in making this the grandest, the wealthiest, and the most powerful of all nations. It is also true that it is in the interest of progress and civilization to aid and to support an educational system that will enable the humblest, the poorest citizen to give his children an education that in most other countries is at the command only of the affluent or the wealthy; an educational system that will enable the son of the day laboring immigrant to become the general of the American army; an educational system that has made it possible for the sons of the humblest citizens to fill our highest places; an educational system that within a century has given the world more men of great deeds than half the nations of the globe; an educational system that inspires ambition, that lifts man upward and onward, that makes cultivated men and women out of the sons and daughters of illiterate European peasants; an educational system that has aided untold numbers of the talented poor to attain distinction, and to benefit themselves and their country; an educational system that has been the means of making thinking animals out of millions who otherwise would have lived, as did their ancestors, in a state of mental vegetation.

Though our educational system may have its evils, its benefits are so far in the ascend-

ancy that we should not alone support it, but we should strive to still more broaden its usefulness.

Our system of education should not alone be made an aid to the cultivation of the mind, but it should be made the means of giving skill to the hand, and this brings me to the heart of my subject.

If it is within the province of the State to cultivate the mind, and if it is within the province of the State to aid those who seek employment in the professions, then why should it not lie within the province of the State to aid those who seek employment in the trades? Is it not fully as important that we should have the means at our command of training our sons to become intelligent and skillful carpenters, plumbers, and masons, as to educate them to become intelligent lawyers and ministers?

Do not the former in fact have far more influence on our health and comfort than do the latter?

Of what benefit is it to be surrounded by eminent members of highly respected professions, if in our very homes life and health are endangered by the admission of the most poisonous and deadly gases through the dense ignorance of so humble an individual as the plumber? Unimportant as the occupation of the plumber may seem, we little realize how enormous is the human misery and destruction caused through his ignorance. How many millions of victims have been claimed through the agencies of scarlet fever, and measles, and diphtheria, and the numerous other deadly diseases engendered by defective plumbing and imperfect sewerage?

How much is added to the discomfort of the American people by houses built with doors that will not close and windows that will not open?

How many lives have been lost and endangered by defective construction of buildings, the result of gross ignorance on the part of builders and contractors?

In saying all this let me not be understood as meaning that I consider it practicable for the State to send forth finished mechanics. This would be as impossible as for the State to graduate finished lawyers, or physicians, or engineers, or journalists, or finished members of other professions.

I fully believe that the State should not attempt to say what trade in after-life the boy shall follow, but the State should afford its pupils an education at least in elementary mechanics, such as will aid in educating the mind through the education of the hand. In other words, the workshop, such as I would advocate, being made a part of every public school, should be used to carry on the kindergarten system on a higher and more advanced plane. To teach industrial object lessons in a manner that will forever implant within the mind of the pupil principles and general laws that may be applied to all industrial pursuits, he is to be taught not alone the laws concerning the use of the plumb, the level, and the square, but also the properties of the cube, the circle, the ellipse, and the cylinder.

An intimate knowledge of these things is of benefit to every person, and almost invaluable to the workman.

And yet how deplorably large is the percentage of workmen who deal with these things mechanically, and without any intelligent conception of the laws by which they are governed. Is it not of the greatest importance that the workman shall handle his tools with wisdom and with intelligence, rather than that he shall work and move as a "machine among machines?" Aside from the "bread and butter" side of the question; aside from the gain in material wealth to the workman and to the State; aside from the gain to the nation in health, and comfort, and convenience, by having in its service an army of intelligent and scientifically skilled laborers, the influence that such an industrial education must have on the *characters* of the workers is yet of still greater value.

Knowledge is character and character is knowledge. True that we may have knowledge without character, but we can have little character without knowledge.

Knowledge develops a finer sense of right and aids to cultivate within us the desire to live more for others and less for ourselves.

Compare the skilled mechanic who has graduated from a training school with the workman of equal native talent, who has picked up what little knowledge he may have of his trade from masters or from fellow journeymen, who themselves are imperfectly instructed, and you will not fail to notice the great difference in their characters. The one is clear in his thoughts and exact in his habits and in his labors. The other has confused notions concerning his work, cannot give intelligent and clearly defined reasons why certain things are done in a certain way, except that he does as he was shown. His work is careless, slouchy, and imperfect. He knows only rules, and not principles. If he is a plumber, his pipes soon leak and burst, if he is a brick mason, his walls soon settle and crack; if he is a carpenter, his poorly finished joints come apart; and if he is a machinist, there is constant friction among the parts of his engine, causing it to soon wear itself out.

The difference in their industrial training explains the difference in the work of these two men, and the difference in the manner of performing their work results in developing two widely different characters.

It is held by some that to introduce industrial training in our public schools is to take away from the pupil the time that should be devoted to the cultivation of a higher knowledge.

What knowledge can be more important or more useful than that which tends to make man more self-reliant and more intelligent concerning the laws with which he comes in hourly contact? The time required in the pursuit of an industrial course need not necessarily interfere with other studies. On the contrary, school workshops afford a chance for change of occupation. The alternative between work and study is of great value.

One gives zest for the other. Labor in the school workshop will largely take the place of play, and serve not alone as an educational factor, not alone as a factor to a higher moral and mental condition to which it is conducive, but it will also serve as a source of recreation.

In conclusion, permit me to give an abstract from a recent report of the workman's school, established some years ago in New York City under the successful directorship of Felix Adler. The great success attending the efforts of this experiment is in itself powerful proof of the entire practicability of school workshops. Every argument that has been raised against such a system is more than answered by the success of the workingman's school of New York.

The report, from which the following is clipped, goes on to say:

"Pupils of the lowest classes work in clay, using compasses, rulers, and blunt knives; they draw upon the clay, and afterwards cut out the simple plane figures, acquiring in this way the elementary ideas of geometrical forms. Pupils next above these grades use paste-board as material, and sharp knives, awls, etc., as tools. The work consists of a series of exercises in stereography, the various geometrical solids being drawn in flat projection, and afterwards folded up and glued into shape. Passing above this grade, pupils next work in flat wood, using the necessary tools, including the bracket saw. Mensuration of areas is taught by this means. Next above this comes a series of exercises of geometrical solids, which are constructed from blocks of wood; those having plane faces being made in the mitre box, and those having curved faces on the lathe.

"Calculation of volumes is taught in this part of the course. For the higher classes, the exercises consist of lessons in making joints, and the elementary study of strains, followed by practice in casting and working metal, and closing with the construction of a small steam engine. At every stage of the course, the nature and limitations of the materials are used, the capacities of the tools employed, and the physical and mathematical properties of the objects constructed, are impressed upon the mind of the pupil. A firm foundation is thus laid for the future study of the natural sciences, and an intelligent understanding of abstract mathematics. Mechanical drawing accompanies the work of the shop throughout the entire course. Nothing is made until it has first been drawn, and the pupil, when he begins his construction, has thus a clear idea of what he intends to produce. The educational equivalents of our workshop instruction may therefore be summarized as follows: Practice of hand and eye, illustrative value in the teaching of geometry and physics, and important influence on character.

PART VI.

BUILDING AND LOAN ASSOCIATIONS, AND CO-OPERATIVE FARMING.

CHAPTER I.

BUILDING AND LOAN ASSOCIATIONS.

More than ten years ago (March 30, 1878) the Legislature passed an Act providing for a commission to investigate the condition of the banking institutions of the State, and report the results annually to the Governor. This was done with the object of securing the people against the danger of being plundered by schemers and designing persons, who, under the display of fictitious capital and high interest, allure victims into their toils. When associations or individual firms are subjected to a rigid scrutiny of their affairs by properly constituted officers, backed by all the power of the law, the danger of being first deceived and then fleeced is to a very great extent removed from the people.

Statistical reports relating to the banks of the State are published by the Bank Commissioners every year, and the Administration as well as all the citizens are informed fully as to the condition of these fiscal institutions.

But there is another and most important institution, in which a large portion of our citizens are financially interested, of whose operations and conditions no report has so far been submitted. The building and loan associations of California have grown rapidly within the past few years. Of the thousands of people who put all their savings into them there are many who do not fully understand how they are operated, and many who know not whether the association to which they belong is in a solvent or insolvent, prosperous or precarious, condition. Next to the savings banks, if indeed not outranking them in importance, the building and loan associations are availed of chiefly by the working classes of the community. As this bureau was designed chiefly to look after the interests of the labor element, I considered that an investigation into the condition of the building and loan associations of this State would be most opportune and beneficial, especially as the work was never undertaken before.

Of course I had to depend upon the information furnished me by the officers of the associations, and their truthfulness or reliability could not be tested by personal investigation, as can be done by the Bank Commissioners. I had neither the means at my disposal, nor the law to support me in exacting compliance with my requests.

However, enough information has been obtained to make a most interesting and instructive exhibit of the building and loan associations of California, to which is prefixed a clear and detailed explanation of the methods by which they are established and put into practical operation.

More than one million three hundred thousand dollars (\$1,300,000) per annum is now paid into these associations in this State. The Secretaries have the handling of this large sum. The need, therefore, of some kind of general official supervision and the necessity of periodical reports become apparent.

The law in Massachusetts authorizes the "Commissioners of Savings Banks to perform in reference to such associations, the same power and same duties as are given them in reference to savings banks and to report annually respecting them."

For the information and guidance of the members of the Legislature and all interested in the subject the laws relating to these associations in Maine, Massachusetts, and Illinois are appended to this report.

"The idea of combining small capitals and minute savings into a fund that might be used to build a home, buy bread and cheese, pay the doctor, start a shop, and insure against death and accident, has always been attractive to all who desire to benefit the people. The idea, under various names, has been made the theme of a great number of experiments, most of which have failed, and a few of which have proved of the greatest value to society. The building and loan association, a system of coöperation, is the idea of associating small individual capital for mutual saving and earning, which has done more real good to the people than any economical system yet proposed. They have built many hundred thousands of homes, saved tens of thousands of dollars for people who actually needed the help, made cheerful many a domestic hearth. They have taught the people economy and fair dealing, and their children prudence, thrift, and self-respect." Recognizing the importance of such associations, and knowing that a full and free treatment of the fundamental principles governing them would be of incalculable benefit, not only to the wage earners, but to all those who desire to secure a home, the following communication was addressed to the Secretaries of all such associations in California with a blank form of questions inclosed:

Secretary of the ————:

DEAR SIR: Your attention is called to the inclosed blank form, with the request that you fill it out as complete as possible, at your earliest convenience, and return to this office. I desire the information for statistical purposes of this bureau, whose reports are widely distributed among the laboring classes of the community. They will be encouraged, by reading facts relating to building and loan associations, to participate in the advantages of such investments. To insure success in acquiring complete data I have secured the coöperation of the undersigned Secretaries of like associations in San Francisco, who see the imperative necessity of encouraging the wage earners to give their attention and patronage to these enterprises. The investors do not understand the essential details about them, and therefore fail to become borrowers and stop paying rent. If the membership of associations generally were fully instructed and non-members enlightened as to the workings of the organizations, and how to borrow, the advantages of borrowing, etc., the number would rapidly increase. Hoping that no serious difficulty will be encountered in furnishing the desired data, we have the honor to subscribe ourselves,

Very respectfully, etc.,

ADVANTAGES OF BUILDING AND LOAN ASSOCIATIONS.

It is deemed hardly necessary to say that copies of the above letter, addressed to some forty Secretaries, met with great favor, and with only two exceptions the information was readily and cheerfully furnished.

To those who did not reply, it is reasonable to suppose that their associations were not in a condition to have the light shed upon them. Many enterprises, both public and private, have met with adversities which do

not always reflect much credit on the business capacity or integrity of their managers. Many of these associations in the southern part of the State are yet in their infancy, but very promising of great results. San Francisco, Oakland, and Alameda have associations which show with what success such enterprises have been developed in California.

In Philadelphia it is said that "there is more happiness to the square mile than in any other place in the world." The reasons for this being that the majority of the houses are small, and the happiest people live in the smallest houses. But this is not the chief reason, as other cities have very small houses, but very little happiness in them. In Philadelphia families own their own dwellings. They are traveling safely and steadily along the prosy road to fortune, or they have arrived there and are householders. It is the winning, the paying for the home, which has made Philadelphia famous. The peculiar manner in which the bills were paid and the landlord abolished has won the attention of thoughtful people throughout the country. In Philadelphia every man may be his own landlord and pay rent to himself. Small wonder is it that her people are steady, thrifty, and domestic in their habits. Real estate rises quickly; the stream of waste that flows to the dramshop is checked; the homely virtues flourish, and marriages increase in number. The young man knows how he can quickly and easily procure a home, and the young woman is more than ready to aid him if a house can be placed at her disposal for so little money. She can buy and even own the house herself independently of her husband, and both can combine to erect and own their own roof-tree, which shall also be their children's home, and the assured shelter for their declining years. No dreadful boarding house stares them in the face, and with reasonable care and industry they can put away the fear of the poorhouse forever. The home is the foundation of the State. The manner in which homes may be secured for all the people, therefore, deserves the careful consideration of the State.

The industrial classes are fast beginning to appreciate the advice which Mr. Micawber, when he was in jail for debt, gave to David Copperfield: "Copperfield, my boy, income £1, expenses 20s. 6d.; result, misery. Income £1, expenses 19s. 6d.; result, happiness."

The increasing interest shown in the study of economic questions proves that the problem how to get the most for one's money is more and more engrossing the attention of the wage earners.

These associations have done much to solve this question.

HOW BUILDING AND LOAN ASSOCIATIONS ORIGINATED.

The industrial classes, with small capital individually, contrive by accumulating their joint funds, to use their capital with as much advantage as the wealthiest monopolies. These associations are among the best tried and most successful of economic organizations. The idea of saving and loan associations, or as they were at first commonly, and even yet occasionally, called, building associations, had its origin in England about the time when all sorts of theories in regard to coöperative industry and investment were being promulgated and put through the crucial test of application to practical affairs. The theory of coöperation in savings and investments stood the test, and building associations multiplied and thrived. They were introduced into the United States, and where other coöperative enterprises have languished and died, they have flourished and increased almost marvelously. Philadelphia has always been regarded as the home of these organizations. Massachusetts early took up the idea, and multiplied the

number rapidly. New York, New Jersey, and adjacent States followed in the wake of Philadelphia and Massachusetts.

BUILDING AND LOAN ASSOCIATIONS OF CALIFORNIA.

Subsequently the same kind of organizations found existence and favor in the western States, crossing the Rocky Mountains into California sometime in the "sixties." The first association of this character is credited to Sacramento, and Simon J. Nathan was largely instrumental in its organization. It was known by the name of the Germania Building and Loan Society, started on the flat plan of what is known as the Terminating Plan, as was the case with five others, started in San Francisco in 1874 and 1875, and named the Mutual, Metropolitan, French, Pacific No. 1, and Standard, all of which are wound up and the shareholders paid off in full, or the mortgages released. The association is conducted as nearly on banking principles as possible, its aim and intention being the establishment of a mutual savings bank, in which the profits, instead of being applied on an idle surplus, shall be divided among the depositors. Among the benefits claimed for these institutions by those who have made a study of them, are these: They aid and encourage people to own their homes, and communities in which savings and loan associations abound are almost entirely free from labor strikes. The people feel the necessity of having money from week to week to make their small payments, and to do that they must have steady employment. Another respect in which they are an incalculable benefit to the people more than savings banks, is that the shareholder is obliged to make his payments monthly or submit to a fine. The depositor in a savings bank, on the other hand, can omit his regular deposit on account of real or seeming stringency in his private finances, with no penalty.

HOW BUILDING AND LOAN ASSOCIATIONS ARE OPERATED.

The system of these institutions have been reduced to an orderly and exact business. It exhibits lenders upon one side, borrowers for every purpose on the other side, the poor lending the rich, the rich both lending and borrowing. Commercially considered they are as safe as the common honesty of men can make them, and in every respect they are safer than the ordinary savings bank. The total collapses, the utter vanishing away of all the deposits, sometimes seen in a savings bank, cannot take place here. The older an institution grows, the richer it becomes. Each month its capital is renewed, and every year an entirely new set of shareholders bring in their fresh capital.

Certainly the depositors, be it the struggling shop girl, the laborious mechanic, or helpless widow, have everything to encourage, and little to make them afraid. It may happen that a dishonest Secretary, in conjunction with the Board of Directors, could abscond, leaving behind victims weeping, wailing, and gnashing of their teeth, as in the memorable cases of Messrs. Berry, of the Mutual; Otto Esche, of the Metropolitan, and Hollis, of the California. This is one of the principal reasons why these organizations, so directly benefiting the laboring class and the State, should be encouraged and incorporated under special laws of the State. In Philadelphia and Massachusetts they have a special legal existence, and have taken a firm hold in the respect and confidence of the people, and there can be no question that they are destined to do a great work for all concerned in house building. The State so encourages these enter-

prises in Philadelphia that the following Act was passed, May 22, 1883, exempting them from taxation for State purposes:

PENNSYLVANIA LAWS RELATING TO BUILDING AND LOAN ASSOCIATIONS.

WHEREAS, Mutual savings fund, loan, and building associations have been heretofore declared by law to be "meritorious and deserving the care of the State," because of the inducements they offer to the people to form habits of economy, and to become real estate owners, "thereby enriching and strengthening the commonwealth;" and, whereas, being copartnerships on the mutual beneficial plan, their profits are made from amongst their own numbers, and not from the outside public; and, whereas, such associations are, therefore, not proper subjects for taxation; therefore,

SECTION 1. Be it enacted, etc., that mutual, loan, and building associations shall be exempt from the provisions of each and every law imposing taxes for State purposes on their capital stock or mortgages, and other securities for moneys loaned to their own members; but the real estate owned by said associations shall be subject to the same rates of taxation as the real estate of other corporations and persons; *provided, however*, that the right of the commonwealth to collect taxes, already accrued, is hereby reserved.

STATE SUPERVISION.

It may be observed that these associations are under the supervision of the State Bank Inspector or other controlling officer, and that they stand on the same footing as savings banks. The depositor in such a bank is hedged about with every precaution; he is taught frugality, steadiness of purpose, and the elements of finance. The plain and only safe road to fortune is pointed out to him, and every step along the sometimes weary way is made the easier.

HOW TO ORGANIZE A BUILDING AND LOAN ASSOCIATION.

Suppose a number of people in a certain place wish to start such an association. Some desire to furnish a safe and profitable means of saving the earnings of those about them; others wish to see the town built up, taxable property increase, and real estate raised in value, or they wish to buy or build a home. There is no capital in the town, except in the hands of one or two hard-fisted fellows, to deal with whom is always a trial and a grind. There is a good deal of money, in trifling sums, scattered through the place. If collected in one fund it might be of great benefit in many ways. These people meet at some private house and become the promoters of the enterprise.

The affair is duly talked over, and the result is that some twenty or more subscribe, say, \$25 each, or one advances the money to the new association, and a fund is thus created. The little capital is to aid in getting account books, and to advertise the new association, etc. Thus far the association has no existence and no capital. The fund subscribed is only the "starting bar" which sets the train in motion. At a subsequent meeting the number of shares is fixed at, say, two thousand five hundred.

Any man, woman, or child can buy at \$1 a share as many shares as is desired, up to a specified limit. (Most associations limit them to twenty-five.) If the people have faith in the promoters, they come forward and buy such as they desire. Perhaps four hundred shares are taken by about one hundred different people.

The next step is to organize, and to elect the officers and Directors. Each shareholder has one ballot (some associations allow as many votes as the number of shares a person holds), and the business is soon finished. The by-laws are prepared and accepted, and the association begins its existence. If time admits, the officers are installed that meeting, and the books of the concern are opened. The pass books and certificates of

stock are issued, the Treasurer presents his bonds, and the salary of the Secretary is fixed. Meanwhile others become interested, and call on the Secretary for shares. Any one who can pay \$1 a month may purchase a share. Women, whether married or single, or the former, independent of their husbands, may take as many shares as they feel they are able to carry. Parents and guardians may invest for their charges. A month passes, and the next meeting is held at some small hall, or in a private office. The cheaper the rent of the room the better, for it gives the association a reputation for economy that gratifies the present members and wins new ones.

The second installment is now paid in, and more shares are sold at \$2 each, and the association declares itself ready to loan money. The meeting is called to order, and the Secretary announces that the association sold at its first meeting perhaps four hundred shares; that some three hundred more were taken during the month, and that one hundred more were taken this meeting. He adds that two installments have been paid on each, and that about \$1,400 is now for sale, something being withheld for expenses. If the premiums offered are high, a few hundred dollars more will be added to this amount. In this simple manner is the business of the association started. There is no confusion; no extravagant bill of expenses; no secret meeting of Directors, eager and thoughtful for their own interest only. All is plain, fair, and above-board. Any member may examine the books of these banks, on demand, and at the end of the year the stockholders appoint from among themselves three auditors, whose duty it is to turn the affairs of the association inside out, and to exhibit its every transaction, in the minutest detail, in a report. Should this report affirm neglect or irregular doings of any kind on the part of the officers; should it point out foolish loans, and ill-considered securities—anything wrong—the entire direction, President and all, may be dismissed, and better men put in their places.

One point here, and which would not be amiss for associations in general to look out for, is the privilege of allowing a stockholder a vote for every share of subscribed stock; the fallacy of which practice stands apparent, when it is possible that the leading shareholders can band together and control the deliberations of the meeting. This is an injustice to the single shareholder who has but one vote, consequently opening a feeling of distrust for those who have a plurality of votes. The spirit of unity and individuality that are characteristic of these enterprises lessen in favor by such a practice. One Board of Directors can hold office and suppress all traces of rottenness, by canvassing and securing the power of attorney to vote from members who are unable to be present at the annual meeting.

ADVANTAGES OF BUILDING AND LOAN ASSOCIATIONS.

To sum up the advantages of these associations by plain illustrations, let us suppose that a society has just been formed, five thousand shares have been subscribed, and Mr. A wishes to buy or build a house. He at first wishes to obtain, for example, \$2,000. The proposition of Mr. A is put to the meeting by the Secretary. Probably Mr. B, or Mr. C, also desire a loan, and state so to the meeting. The right, therefore, to the money to be advanced is put up at auction. Mr. A bids 15 per cent bonus or premium, as it is technically called. Mr. B, anxious to receive the money, bids 20 per cent, while Mr. C, as anxious as either, bids 25 per cent. Mr. C being the highest bidder is entitled to the privilege of the loan. Mr. C in order to get the loan of this \$2,000 must have ten or more shares of the

stock in the association, that is to say each member is allowed to borrow \$200 on every share subscribed, less the bonus he bids for the priority. The committee appointed on loans examines the security offered, and subsequently reports pro or con on the propriety of granting the loan. The Board of Directors are consulted, the attorney examines the titles, etc., and the \$2,000, less the 25 per cent premium, is paid. The great advantages of these associations now become apparent. Mr. C probably has paid rent for over ten years at \$20 per month, which is equal to \$2,400 he has paid out to a landlord at a total loss. With old age comes wisdom; he now determines to erect or purchase a home and stops paying rent. With the money he has just purchased, \$2,000 less \$500 premium, or \$1,500, he buys a fine, cozy little home. He now feels new life, his wife becomes young and spirited again, his children at the prospect of such a change crowd nightly around the domestic hearth or climb their aged sire's knee to whisper words of comfort into his ear. Such happiness was never before felt in that domestic circle. The first month passes along smoothly, and the meeting night comes for him to pay his first installment on his home. Owning ten shares there is due \$1 per month for each share—\$10. Six per cent per annum is also payable on the \$2,000, or \$10, making a total of \$20 a month he pays the association. Monthly he thus pays his dues, until at the end of the period the following will be the result of his status:

To monthly installments on stock, 120 months	\$1,200
To monthly interest on loan, 120 months	1,200
Full amount paid association	\$2,400

The house is the man's own, the mortgage is discharged, and his paying rent is stopped forever. Had rents continued to be paid during these years he would have paid \$2,400 out and still have been without a home. In the meantime his property has enhanced in value, his children have grown to manhood and womanhood, the prop and support of his declining years. No rent to pay, no poorhouse staring them in the face, no landlord with itching palm pestering him to madness. Let us now turn to Mr. A and Mr. B and see what they have been doing all these years. They became dissatisfied and withdrew from the association, going to a bank for their money. The bank advanced \$2,000 on good security, appraised at 40 per cent more than they advanced, charging 6 per cent interest. For this loan of \$2,000, at 7 per cent per annum, Mr. A and B must pay yearly \$140.

Interest for ten years	\$1,400 00
Principal	2,000 00
	\$3,400 00
Amount paid association by C	2,400 00
Difference in borrowing from bank	\$1,000 00

Instead of paying slowly but surely, as Mr. C, into the association, A and B were paying interest on the capital without reducing the capital itself. Some untoward circumstances may occur, payment of interest is demanded, it cannot be met, and the result foreclosure. The house and home are lost, the interest paid the bank is in the pockets of capitalists, who are smiling contemptuously at your failure. These institutions are undoubtedly destined to supersede the savings banks, owing to the superior advantages they offer to the people. The net plan of these associations in paying the premium monthly with the interest is certainly far better than the gross plan of deducting the full premium from the loan. It is less

liable to create a feeling of distrust among the members. Fixing the payments is far better than the uncertainty of bidding at auction. It opens a system of competition, which is not in harmony with the spirit of helping one another to a common end. The best way to help people is to make it as easy as possible for them to secure a home that will shelter them from the storms and rains that are in every life.

METHOD OF CONDUCTING BUILDING AND LOAN ASSOCIATIONS.

The *modus operandi* of conducting the loans of these associations is graphically illustrated in the following categorical manner by C. K. Clarke, Secretary of several of these associations:

In what respect does the building association loan differ from other loans?

In almost all loans (whether from a bank or a private capitalist) where security is required, you give your note due at a certain time with interest; you are required to pay the interest at stated times, and the note itself when due. There is also what is called the installment loan, which calls for the payment of a certain amount of the note monthly with the interest. Such payments, if made regularly, pay off the mortgage in a given number of years. The building association loan differs from these loans in the following important particulars:

First—You are the owner of a certain number of shares in a building and loan association, which entitle you to \$200 for each share you hold. You took the shares to obtain a loan, or, more properly speaking, to obtain in advance the par value of the shares.

Second—Having obtained this advance or loan you are obligated to pay promptly certain monthly dues of \$1 per share and the interest on the gross amount of the loan.

Third—If you perform these obligations regularly the association never can call in the loan, and the note is paid by the stock dues and the profits, which are credited, as it were, to your account as a stockholder.

Fourth—The so called mortgage which you give is security to the association that the obligations mentioned above will be met. If you fail to meet them you forfeit the security; in other words, the mortgage then becomes due and is payable out of the sale of the security. As a borrowing member in a building association, you are simply a paid-off stock member or an "advanced" member holding "redeemed" stock, and the interest which you pay continues until the association can pay off \$200 to all members in the series, when you will receive a release of the mortgage, and the non-borrowing member will receive \$200 for each share he holds.

Do you recommend such a loan to all persons; if not, tell me whom it benefits?

I do not recommend such a loan to a speculating capitalist, nor to any one who has not a steady monthly income from some source. I do not recommend such a loan to one who cannot see and appreciate the benefit of small savings, and who prefers a continuing debt or loan to a gradually canceling debt. I do not recommend such a loan to a person who wants the accommodation for a few years only, and who would take it with the expectation of repaying the principal of the note before maturity. The building and loan association is not a bank. Its borrowers may be called paid-off stockholders under mortgage, and its investing stockholders are expected to become such sooner or later, or withdraw. It is true that short "loans" on mortgage or stock security are sometimes made, but when a bonus is bid for the loan they are not profitable to the maker, while that association is the most prosperous and successful which adheres strictly to the fundamental principles of its organization and the purpose for which it was created, viz.: to issue stock, create a fund, and from that fund to permanently retire the shares at par value, in such order as may be determined by the bonus or premium paid for priority right.

Among those who are in a position to successfully use the building and loan association as borrowers, I may mention the following: Mr. A owns land, which is paid for and is clear of debt. He wants money to the extent of 60 or 80 per cent of its market value, for the purposes of business, or for paying off an accumulation of liabilities, or for the purchase of other real property. Mr. B owns a building lot, fully paid for or nearly so. He wants money to build thereon a dwelling to be used for a private residence, for the payment of which the monthly installments and interest will not exceed a sum for which the same would rent. Mr. C has saved and laid by a sum of money sufficient to make a one fourth or a one fifth payment towards the purchase of a lot, with improvements of a dwelling house, etc., all complete. He wants money on a mortgage of the premises to complete the purchase and obtain the deed. Mr. D has owned for a number of years a lot, or a house and lot, upon which a mortgage due to the bank or a private capitalist have been standing. As there is a prospect of its continuing to stand unpaid for an unlimited number of years, he wants money to obtain a release of the standing mortgage by substituting a mortgage that will pay itself off in due course of time.

Mr. E owns unimproved property in a locality where houses would readily find tenants, or could be sold to those desiring to purchase by paying monthly installments extending over a period of six, eight, or ten years. He wants money to make such building improvements from time to time. All these persons find the building and loan association just

what they need to help them; and it is among such persons the building and loan association looks for members.

What kind of a contract do I enter into when I borrow from a building and loan association?
As this is an important question, I will state the nature of your contract as the law on building and loan associations gives it. When a member of a building and loan association becomes a borrower his contract may in general be said to embrace the following essential features:

1. The member agrees to receive the advancement from the building association, and to allow for the privilege of the preference a certain stipulated price, premium, or bonus.

2. He undertakes, and gives security in support of the undertaking, faithfully to perform to the termination of the society's existence, or the running of a series, all the requirements of its constitution and by-laws relative to stock payments or dues, fines, and other charges, upon and in respect of the shares held by him (which, as a rule, he pledges to the society as collateral security), and to be liable for and discharge all proper dues, assessments, contributions, and charges arising upon them, in the same proportion and in the same manner as the rest of the members, and, in addition, to make a fixed periodical payment by way of interest on his loan.

3. He agrees, upon the termination of the society or series, when its assets shall become distributable, that it shall appropriate to its own reimbursement the proportion accruing to such of his shares as were advanced to him.

4. He agrees that, in case of his failure at any time to perform the continuing conditions of his undertaking for a certain period, or for such remissness in the payment of dues, etc., as would be ground for forfeiture of his shares as a member, the society shall be absolved from the necessity of waiting until the period of dissolution for its payment, and shall have the right to demand and recover it from him at once, including in the debt not only the amount actually loaned, but all payments and charges which may lawfully, under his obligation as member and borrower, be demanded from him.

The building association, in its turn, assumes corresponding obligations towards the borrower.

1. It agrees to let him have the use of the money advanced during the continuance of the society's legal life, or the running of a series, providing he lives up to his undertaking.

2. In the meanwhile it is to receive and invest the payments made by him, both as dues and as, or in lieu of, interest, in the same manner as those of other members and as part of the common fund.

3. Finally, upon the winding up of the concern it is to account to him for such proportion of his whole accumulation as may be coming to his share, retaining so much as may be necessary to cover his proportionate share of the losses and expenses and applying the balance to the liquidation of his debt, including the actual advance, interest, fines, and premium, according to his undertaking, and thereupon canceling his securities.

If I borrow \$1,000 from a building and loan association and get only \$800, what becomes of the difference—\$200?

The difference between the face of your note and the amount of money which you receive is the premium or bonus which is bid in order to secure the advance or loan with all the advantages accompanying such a loan. But you do not state the fact correctly. You would understand it better if I state it thus for you: You borrow \$800 and agree to pay \$200 additional as the premium, making \$1,000. The note which you give consists of two items: First, the money you receive, and, second, the premium which you agree to pay.

When do I pay that premium?

You pay that premium by and through the profits of the association, and in no other way, unless you forfeit your loan by breaking your contract, or repaying your loan before the profits have paid the premium for you.

Then, if I continue the loan until my shares have paid it up, I do not in reality pay any premium—I simply agree to pay it. Is that the case?

We take your note to represent your debt at the rate of \$200 for every share thus "redeemed," and the note and mortgage convey a promise on your part to repay said money upon the terms and conditions laid down in the by-laws of the association. Those terms and conditions constitute a part of that peculiar scheme called the building and loan association, and when carried out on the principle of equity to all, the results are sometimes truly surprising.

Show me how my shares pay the note, including the premium which is combined with the note?

By way of illustration, I will take a case from actual experience from the books of an Oakland association, and will show you how a note and mortgage can be paid off year by year, and so paid off that less than two thirds of the amount actually received will be returned in cash, not including interest. The loan was \$800, including \$200 premium, making a note and mortgage of \$1,000 given by the member in 1876. The account may be stated as follows:

Loan, with \$200 premium	-----	\$1,000 00
Repaid as follows:		
1877. 12 months, 5 shares at \$13 94	-----	\$69 70
Balance due	-----	930 30
1878. 24 months, 5 shares at \$32 12	-----	160 60
Balance due	-----	839 40
1879. 36 months, 5 shares at \$51 21	-----	256 05
Balance due	-----	743 95

1880.	48 months, 5 shares at \$73 55.....	\$367 75	
	Balance due		\$632 25
1881.	60 months, 5 shares at \$97 10.....	485 50	
	Balance due		514 50
1882.	72 months, 5 shares at \$125 05.....	610 25	
	Balance due		389 75
1883.	84 months, 5 shares at \$147 40.....	737 00	
	Balance due		263 00
1884.	96 months, 5 shares at \$175.....	875 00	
	Balance due		125 00
1885.	104 months, 5 shares at \$200.....	1,000 00	
	Release given.		

On the above loan \$520 was paid as dues; the balance of the note of \$800 was paid by profits. The \$200 of premium was also paid by profits.

The above illustration shows the balance that was due on the loan from year to year. If the member had repaid the loan at the end of the second year he would have received no apparent benefit from his stock payments, as in repaying the loan he would have paid the association \$89 40 more than he received.

At the end of the fifth year, if he had repaid the loan, he would have received the benefit of his payment on *dues only*, viz.: \$300, which, deducted from \$800 (the amount he received), would leave \$500 to pay.

If I take five shares, am I not entitled to a loan of \$1,000, or \$200 per share?

If you take five shares as a borrower, you will receive from \$160 to \$180 per share, according to the rate of premium prevailing.

But do I not give an obligation to pay \$200 per share, and pay interest on \$200 for each share borrowed on, and thus pay interest on more money than I receive?

You pay interest on more money than you received because the amount you did not receive is the amount you agree to pay for the right of obtaining the money ahead of the member or members who may have bid a little less than you did.

If you say that you borrowed \$1,000 and paid \$200 for the loan, then I say the \$200 is given back to you as the loan matures.

If you say you borrowed \$800 and agreed to pay \$200 for the priority right (which is the correct statement), then I say your promise to pay is redeemed by the association itself: the \$200 premium is canceled and taken up by the profits coming as your gain on five shares.

If I do not borrow then I will receive \$200 per share, will I not?

The man who is not compelled to borrow will become rich faster than the one who is: but between two borrowers, the one who borrows from his own loan association will become rich and get out of debt faster than the one who borrows elsewhere. If you borrow, the prospect is that you will receive \$160 to \$180 on your (200) shares, and have the use and benefit of that money for many years. If you do not borrow, the prospect is that you will receive no more than \$160 to \$180 per share under the plan upon which associations are now conducted, for the associations will not guarantee to mature all non-borrowers' stock, especially if too large a proportion of members refuse to become borrowers.

What regulates the rate of premium?

The rate of premium is regulated in the same manner as the price of everything else is regulated, viz.: the supply and demand. If an association has \$4,000 per month to sell, and \$8,000 is wanted by five or ten members, the premium will be high. If an association has no money on hand, but borrows and sells the income of the following month or months to supply the demand of members, premiums will then be maintained at such a rate as will pay the association to borrow or overdraw from the Treasurer's account.

What inducements are offered sufficient to warrant members in paying \$40 to \$50 per share premium—that is to say, twenty to twenty-five per cent?

If the premium becomes established by custom at a certain rate, that will, with the interest at a certain rate, mature shares in say eight years, members are doing themselves no injustice if they pay that rate. If they pay less than the average, they gain that much over others; if they pay more than the average they lose that much. Directors aim, as far as possible, to maintain the premium at an even rate each year by allowing no accumulation of money, and by active efforts in keeping up the demand for loans, in which work all members are equally interested.

If the membership of an association, investors and borrowers, are satisfied to run a series out in ten to twelve years, they will be satisfied to pay and receive low premiums. It follows that the lower the premium and interest the smaller is the amount to be paid at the beginning, and the greater is the amount to be paid before the end is reached. The higher the premium and interest the greater is the amount to be paid at the beginning, causing less to be paid to reach the end.

Members bidding for money are governed by the following considerations:

1. The money is to be obtained on loan, with facilities for the gradual liquidation of the debt not elsewhere to be obtained.

2. The amount of money obtained is generally more than could be obtained elsewhere on the same security.

3. The probability that the amount the borrower will be obliged to lay out in the eventual return of the loan will be a sum much less than the amount actually received, not including interest. All these considerations, together with the mutuality of the whole plan, amply compensates members for offering an apparent high rate of premium.

If my loan is (for example) \$800, premium \$200, why is it that if I repay it before maturity many associations require me to pay \$1,000, less the value of the shares at the time of repayment, and allow nothing more?

This opens up a question of considerable interest and importance. It is true that although you have had \$800 and agreed to pay \$200 more, you will not be required, under the scheme, to actually pay more than \$550 of principal in the shape of dues, if continued until the ultimate value of \$200 per share is reached; but with your obligation to pay dues was also the obligation to pay interest, the two together making a payment (with interest at $6\frac{1}{2}$ per cent per year) of \$10.50 per month. Now, if the shares were to continue say one hundred and eight months (nine years) before arriving at maturity, the sum of all your monthly payments, interest included, in that time would be \$1,134. If, now, you wished to repay the loan after making thirty-six monthly payments, the payments made, viz., \$378, would be deducted from the whole amount of payment due, viz., \$1,134, leaving \$756 as the balance of the loan due three years after taking the advance.

In four years the balance would be	\$630
In five years the balance would be	504
In six years the balance would be	378
In seven years the balance would be	252
In eight years the balance would be	125

It will be observed that the above balances, ascertained by the rule just laid down, nearly correspond with those given heretofore by an association in actual operation, and found by deducting the book value of the shares from year to year from the gross amount of the loan. "The true view to be taken of a building association loan, in fact, is that the return of the money received, at any period intermediate between the time of taking it and the time of the ultimate squaring of accounts upon the expiration of the society or series, is not contemplated by the contract. That money is never, before that period, intended to be collected or repaid. The essential feature of the contract is the continued payment of certain dues; the incident, the payment of interest as a compensation for the use of the money.

"Such, then, being the real nature of the borrower's undertaking—to continue, throughout, certain stipulated payments—it would appear that the very terms of the contract precluded any determination of its requirements before the period set by itself. But it promptly became recognized that a method by which the borrower would substantially comply with the requirements of his contract might absolve him from the literal fulfillment of it; *i. e.*, that having obligated himself to a long series of small payments, he might be allowed to substitute, in lieu thereof, a single larger one, equal, at once, to the aggregate of all the smaller ones.

"The rule has, therefore, been adopted in England, and recognized in America, that a borrowing member of a building association may redeem his property mortgaged and discharge his indebtedness to the same, upon payment of all the future subscriptions which would accrue against him until the winding up of the series, its probable duration to be ascertained by calculation, and the future payments to be treated as if immediately due."

Several cases which define the rights of repaying borrowers have been decided by the Courts. They have held that an advance made to a member upon his shares was not a loan; but an anticipatory payment, by way of discount, of the shares he would otherwise have been entitled to at the termination of the series; and that the mortgage deed was to secure future subscriptions, etc., until that period, and that a member could only redeem upon payment of his subscriptions down to the end of the estimated duration of the series.

Some associations allow the return of loans upon more liberal terms to the borrower than those I have mentioned, such, for instance, as allowing a certain part of the premium to be deducted upon payment of the loan. Others inquire into the circumstances of the case, and make such terms upon which repayment can be made as will be just to the association as well as to the borrower, keeping in mind the settled principles of building association law governing the contract.

I understand you do not think it is profitable to repay a loan; is that so?

Unless the directors allow you a deduction from your loan on account of the premium which you owe, it is not profitable to repay a loan which has run less than five years. Unless circumstances compel you to repay the loan, or you find your association is being managed at a loss and in danger of being ruined, you will lose by repaying your loan before maturity. You will always gain by allowing your installments of dues, etc., to repay the loan. Hence it is that Directors do not encourage the return of loans and are under no obligations to make the terms of return so liberal that the loans will come in and go out as in a bank, between which and a building association there is a wide difference.

How would you recommend the settlement of a building association loan between buyer and seller of the property mortgaged?

I would recommend the basis to be first the gross amount of the loan, and from that deduct such proportion of the premium as remains unpaid; estimating eight years, one eighth of the premium would be paid each year. From this balance deduct the full value of the shares. Let me illustrate it thus: A loan was made by A for \$800, premium \$200, two years ago at the beginning of the series; in selling the property now to B for \$1,500, how much must B pay A if he continues the mortgage with the association in A's place?

Gross loan.....	\$1,000
Less six eighths of the premium (\$200) unpaid.....	150
	<hr/>
	\$850
Less value five shares two years old.....	150
	<hr/>
	\$700
Total sale \$1,500, from which deduct \$700 above, leaving \$800 cash due from B to A in settlement.	
The same result is arrived at if we take the—	
Net amount.....	\$800
Add the two eighths (two years) premium paid.....	50
	<hr/>
	\$850
Deduct the value of the shares.....	150
	<hr/>
Balance.....	\$700
to deduct from the price (\$1,500), leaving \$800 due from buyer to seller.	

What steps do I take to obtain a loan, and to repay it before maturity if I choose to do so?

To obtain a loan you must own shares—one share for every \$200 of your loan.

Every member is entitled to bid for money; and to become a member you must pay at least one month's installment on your shares and sign the by-laws.

Money is sold once a month, on the nights when payments are made. You will attend the meeting, and when the money is offered, make your bid. The money will be knocked down to the highest bidder. If you cannot attend the meeting, you will delegate some one to act for you in bidding off the loan.

You will present your application at once, stating the security which you offer for the loan. If the security has not been previously examined by the committee, it will be referred to the committee, whose duty it is to report upon the application. The committee will make a report at the following meeting. If it is favorable, and recommended by the Board of Directors, your application, with whatever papers you have, will be referred to the attorney of the association to examine the title and prepare note, mortgage, and other papers necessary for you to sign.

After the mortgage has been placed on record you will be entitled to a payment, either in full or on account, of the loan. If the money is to be applied on a building to be erected, the payments will be made in two or three amounts as the building progresses, and the money will be paid upon orders drawn and signed by the Finance or Security Committee. If the loan is made upon unimproved property, or upon property already improved, the payment will be made in one amount. You have now received your loan or advance, and hereafter, with every payment of your monthly dues, you will also make a payment of interest according to the rate established.

If, now, you want to repay your loan before the maturity of the shares, you will make an application for that purpose to the Board of Directors, and they will notify you upon what terms they will receive the loan back. If at any time you want to know the balance due on your loan in order to ascertain how you stand, apply to the Secretary, and it will be his duty to inform you. From the first to the fifth year about one twelfth of the mortgage will be paid off each year. From the fifth to the ninth it will be paid off more rapidly.

You have explained a great deal to me about the loan, now let me ask you what guarantee or assurance have I that what is expected of the building and loan association will be realized?

Join a good association. If it has a good back history or record, all the better. In any event you must have confidence in those who are managing the institution. The principles upon which the scheme is conducted have been so thoroughly tried and tested by sixty years of practice in the United States that they may be relied upon. Men must be trusted to carry them out successfully. If you know that you are in an association with honest men, who understand the business, you may know that you have a good thing. If you don't know your men, then find them out, and watch them in any and every case, and never cease to watch them, and hold them to a strict account for their stewardship. We believe the building and loan associations in California are in the hands of good men. The day in which small savings are despised among us is fast passing away.

In the Eastern States building and loan associations have come into popular favor so rapidly that few persons realize the influence they have on the welfare of society. In Philadelphia their benefit to the commonwealth has been recognized in releasing them entirely from all taxation. In that city of nearly a million, seven tenths of the people own the homes they live in, acquired through the building and loan associations.

The capital stock of the building and loan associations of the United States, a writer says, exceeds the national debt, and is equal to the capital stock of the railways.

The associations number several thousand, and represent the most gigantic system of cooperation ever undertaken in the world.

From the returns to this office, it is found that the associations are run in all shapes and ways, and the "interest question" figures to suit the majority of the officers. In some parts of California the success of these

associations is phenomenal, while in others they drag along. Every accommodation is offered to dispose of stock; some lend money on both gross and net plan, and figure the premium and interest at a minimum in order to render those enterprises more successful. But the great trouble with the associations is that speculators go into them, take from forty to fifty shares, borrow the full amount, build houses and fill them with tenants, thus placing working people in a position where the idea of a home of their own is impossible.

Another evil is their organization by men simply to get elected Secretary for the sake of the emoluments of office. It is imperatively necessary, as a matter of public information, and for protection to the hundreds of wage earners of the community, that the associations should file annual statements somewhere. Some of the Secretaries have indorsed the idea of a law being passed compelling them to report to the State Bank Commissioners. Some also advocate the idea of organizing a State league of building and loan associations in order to disseminate information relating to these institutions, compare experiences, secure uniformity of procedure and method in their organization and management, so as to run without new ones copying the errors of old ones, thus placing them on a basis of strength and stability. The attorneys of some of these associations spoken to are one in recommending having special State laws passed for them.

UNFAIR DISTRIBUTION OF SHARES.

Where these associations are regulated and protected by law, they offer greater opportunities to the wage classes. Capitalists and speculators cannot monopolize them nor divert them from their legitimate purposes. In several of the associations most of the shares are subscribed by men of means, who invest to realize a high rate of interest, or as a speculation. Some hold one hundred shares, some forty and fifty, others twenty and thirty, while very few are found where the shares are less than ten. These men with one hundred shares are entitled to a vote for every share. The poor, struggling workman with but five shares is a pigmy when compared to the capitalist shareholder. The law should throw all possible safeguards about these poor investors. It could specify the details of management, the limitation of salaries and expenses, the regulation of the maximum stock to be held by any one person, fixing the matter of electing officers, limiting the vote to one share, independent of the number of subscribed shares. In other words, it would be placing the whole management and machinery into the hands of the membership. It must be remembered that these institutions are not speculative in character. They make no representations of golden hue, promising the wealth of King Solomon's mines, or fabulous fortunes, as the advertisements read, to a "good, steady, reliable, and energetic man with a little capital." They do, however, offer to the workman with a little patience and self-denial, a home at a cost of about the amount that would be paid for rent in eight or nine years. Many of the wage classes who are borrowers in these associations complain of the expense that is met with in arranging mortgages, and the drawing up of them by attorneys. This matter could be obviated by the Legislature prescribing a blank form to be used in common by all associations.

NECESSITY OF LEGAL PROTECTION.

Kansas, Connecticut, New Jersey, Pennsylvania, Maine, Illinois, Massachusetts, and several other States have laws regulating these associations.

Illinois and Massachusetts, as being the most complete, are herewith appended. These laws have a tendency to infuse hope and confidence into timid investors. They protect the weak against the strong, the poor against the rich, and few speculative and unscrupulous men have control of them or use the funds for personal aggrandizement.

This bureau encountered great trouble from several Secretaries when they were asked to send a detailed statement of the resources of their respective associations. The reports sent us in many cases were neither satisfactory nor intelligible, reflecting but little credit on their managing officers, which fact alone confirms the representation made of the great need of an inspection by proper official authorities.

The Mechanics Building and Loan Association of Sacramento, and the Oroville Building and Loan Association, notwithstanding the repeated urgency of the bureau, refused to respond, nor did the Secretaries have the courtesy to acknowledge the receipt of the many letters sent.

MASSACHUSETTS BUILDING AND LOAN ASSOCIATIONS.

That these institutions have met with great favor in the East, and are enlisted in the confidence of the people, is evident from the report for 1887 of the Bank Commissioners of Massachusetts.

They say that these institutions have largely increased the past year, numbering now fifty-one, an increase of eleven, the largest gain in any one year during their history. The steady and rapid growth of the coöperative banks of this State, their increasing financial strength and continued development, manifests their hold upon the community and importance and value therein. The compulsory character of these institutions in relation to the monthly savings of their members is an element of their strength, and a very important factor in serving the interests of their depositors in developing methodical habits as well as securing accumulations and acquiring homes.

The total assets of the building and loan associations of Massachusetts, October 31, 1887, were \$4,211,948 86, a gain over last year of \$982,982 24.

THE BUILDING AND LOAN ASSOCIATIONS OF CALIFORNIA.

California has sixty building and loan associations, seventeen of which are situated in San Francisco, six in Alameda County, eight in Los Angeles County, and the remainder are scattered throughout the different parts of the State. New ones are springing up daily; five were organized during the years 1872-73-74-75; three between 1876 and 1880; fourteen between 1880 and 1886; five in 1886; nineteen in 1887, and for the first six months of 1888 five have been organized. The year 1887 seems to mark a new era in the impetus given to these enterprises. They sprung up in all parts of California like the magic seed of the Indian juggler, which grew, blossomed, and bore fruit before the eye of the spectator.

The number of incorporated shares of all the institutions in the aggregate is two hundred and sixty-one thousand seven hundred and fifty, representing a total corporated capital of \$47,500,000. Seven are what are called the terminating associations, and the balance, fifty-three, are the serial or permanent associations. Seven are on the verge of maturing, as the stock has reached the par value of \$200. The total number of subscribed shares, one hundred and nine thousand three hundred and seventy-three, is divided among ten thousand and eighty shareholders, or an

average of ten to each, making \$109,373 that is paid into these associations monthly. Three thousand eight hundred and ninety-six loans have been made, equal to \$4,388,251 77, used by the members in paying off mortgages or building themselves homes. The profits allowed to withdrawing members vary from 4 to 8 per cent, averaging about 6 per cent. As indicated in Table I I, the opinion is expressed that these associations will mature in from six to nine years, while it is quite evident to me that a few will not be matured at the millenium. But, by prudent and honest management, the average time of maturity is nine years.

REMARKS FROM OFFICERS AND MEMBERS OF THE BUILDING AND LOAN ASSOCIATIONS.

No. 1. Considering the field in which this association was organized less than two years ago, also the absolute want of knowledge regarding these institutions prevalent among our community, there is no doubt that the promoters of this association have to congratulate themselves upon the success attained thus far. In our membership we have all our best citizens; the institution is growing steadily in favor; it has helped many to acquire homes or wipe out otherwise burdensome indebtedness; and more are getting ready to avail themselves of its aid. In closing I would request you to send me, when published, some of the reports, which I would gladly distribute around here.

No. 2. We would be pleased to receive from you any information in regard to building and loan associations that you might be enabled to furnish us with. We hope your efforts to promote our mutual interests may be successful and productive of much good.

No. 3. We are yet young and in a very crude condition, but are working up into regularity. At first many do not understand the plans and are careless and sometimes delinquent, but we hope soon to make a plain showing.

No. 4. I filled out the blank as well as I could. We are only one month old yet, so it is hard to give a better statement. I hope this will meet the required information of the bureau.

No. 5. A large portion of our stockholders are men working for salaries and are workmen, some of whom never saved a dollar in their lives until induced to save through the association.

No. 4. I would advocate a State League, whereby the Secretaries of all the building and loan associations in the State could hold an annual convention and inaugurate a uniform method of procedure, talk over matters of the past year, and introduce new forms that would materially advance the cause of these associations. They should be released from taxation for State purposes.

No. 5. These associations should report annually to some source, either to the Bank Commissioners, State Labor Bureau, or to a special committee selected in convention by all the Secretaries in the State.

No. 6. Many of our associations are used for speculative purposes. The number of votes for a shareholder should be regulated by law. A good law may be beneficial, but it should be free from all "loop holes."

No. 7. As for myself, I should like to see these institutions regulated by law, but am afraid it would meet with great opposition from the majority of the Directors. Monopoly can control these associations at present.

No. 8. These institutions encourage thrift and economy among the poor people. The land of the classes is soon acquired by the masses, as we build or buy homes for all borrowers. Such associations are productive of the best of fruits, having built thousands of homes in Pennsylvania. The people of California are too greedy for fortunes, desiring to grow rich in too short a time. The time is coming when people will see the inevitable good results of small investments. The savings banks are antagonistic to these enterprises, and try to discourage people. A law could do no good; besides, we are a private corporation and should conduct our own affairs. We are partners in a common cause, and repose trust in our Directors. Several cases have occurred where the Secretaries got off with the funds, but the people should elect honest Secretaries.

No. 9. The Secretaries do not receive salaries enough. All enterprises should pay the man who minds the finances a decent amount. Too much secrecy is manifested in the different associations. If the State should enact special laws it should stipulate a proper salary for the Secretary. Many people have secured homes from these associations. I got myself a home through them and bought other property besides.

No. 10. I do not know of what nature special laws should be, nor what good they could do; but, if they have been productive of good in other States, I suppose the necessity may exist here for them. The Secretaries and Boards of Directors manage the affairs of the associations to suit themselves, which is nobody's business but the shareholders. They encourage economy and to my knowledge have saved many who were living from a hand to mouth sort of a way. Our association is young, but has met with great favor.

SUGGESTIONS FROM SECRETARIES OF BUILDING AND LOAN ASSOCIATIONS.

No. 1. In consideration that these institutions are meritorious, and help the poor to obtain a home, and thus make better citizens, they should be exempted from paying the mortgage taxes, as they are in some of the Eastern States, where the great good which they do is well known.

No. 2. Mortgage taxes should not be charged to these institutions, as they make good citizens of all their members.

No. 3. These institutions should be fostered by the State, as they help the poor to obtain a home, and thus make good citizens. The mortgage tax should be abolished.

TABLE I. L.
I.—*Building, Loan, and Savings Associations in California.*

FULL NAME OF ASSOCIATION.	Location.	Date of Incorporation.	Number of Incorporated Shares.	Amount of Incorporated Capital.	Terminating on Serial Plan.	How often are Shares Issued in Series.	Name of the Secretary.
Citizens Building and Loan Association.	San Francisco.	Jan. 14, 1885.	15,000	\$3,000,000	Serial	Quarterly	Chas. K. Clark.
Commercial Building and Loan Association.	San Francisco.	Dec. 21, 1886.	5,000	1,000,000	Serial	Semi-annually	Chas. K. Clark.
California Mutual Savings Fund, Loan, and Building Association.	San Francisco	Mar. 26, 1887	5,000	1,000,000	Serial	Semi-annually	S. R. Church.
Equitable Building and Loan Association.	San Francisco.	Oct. 21, 1885.	5,000	1,000,000	Terminating	Terminating	J. A. Fischer.
Fidelity Building and Loan Association.	San Francisco.	Mar. 19, 1887	5,000	1,000,000	Serial	Annually	W. Lutz.
Franklin Building and Savings Association.	San Francisco.	—, 1875.	3,000	600,000	Serial	Every six years	W. Hajje.
Home Mutual Building and Loan Association.	San Francisco.	Dec. 2, 1885.	5,000	1,000,000	Serial	Semi-annually	Chas. K. Clark.
Italian-Swiss Mutual Loan Association.	San Francisco.	April 1, 1887.	10,000	2,000,000	Serial	Annually	A. Sharboro.
Mutual Savings Fund, Building, and Loan Association.	San Francisco.	June 4, 1883.	5,000	1,000,000	Terminating	Annually	J. W. Butler.
National Home and Loan Association.	San Francisco.	Nov. 5, 1885.	5,000	1,000,000	Serial	Annually	N. Schlessinger.
Occidental Loan Association.	San Francisco.	Aug. 24, 1885.	5,000	1,000,000	Serial	Annually	L. L. Denney.
Providence Building and Loan Association.	San Francisco.	Sept. 24, 1887.	5,000	5,000	Serial	Annually	S. Epstein.
Pacific Loan Association.	San Francisco.	Dec. 4, 1884.	10,000	2,000,000	Serial	Annually	L. L. Denney.
San Francisco Mutual Loan Association.	San Francisco.	Oct. 28, 1882.	5,000	1,000,000	Serial	Annually	A. Sharboro.
Security Loan Association.	San Francisco.	April 19, 1888.	5,000	1,000,000	Serial	Annually	L. Blank.
Union Loan Association.	San Francisco.	May 1, 1881.	5,000	1,000,000	Serial	Annually	L. L. Denney.
Western Loan Association.	San Francisco.	Nov. 10, 1887.	5,000	1,000,000	Serial	Annually	L. L. Denney.
Alameda Building and Loan Association.	Alameda.	Mar. 27, 1876.	5,000	1,000,000	Serial	Semi-annually	Chas. K. Clark.
California Building and Loan Association.	Alameda.	Feb. 9, 1888.	5,000	1,000,000	Serial	*	Chas. E. Naylor.
Honestead Loan Association.	Berkeley.	Mar. 3, 1886.	5,000	1,000,000	Serial	Semi-annually	Chas. K. Clark.
Benicia Building and Loan Association.	Benicia.	Jan. 11, 1883.	3,000	600,000	Serial	Annually	O. B. Allison.
Colton Building and Loan Association.	Colton.	Jan. 3, 1883.	1,000	200,000	Terminating	*	John G. Sloane.
Fresno Building and Loan Association.	Fresno.	July 25, 1887.	1,500	300,000	Serial	*	Geo. E. Freeman.
Metropolitan Loan Association.	Los Angeles.	—, 1887.	5,000	1,000,000	Serial	Annually	Chas. Hornback.
Southern California Loan Association.	Los Angeles.	Mar. 11, 1887.	5,000	1,000,000	Serial	*	Chas. Hornback.
Savings Fund, Building, and Loan Association.	Los Angeles.	Mar. 13, 1883.	5,000	1,000,000	Serial	Annually	E. H. Grasett.
Union Building and Loan Association.	Los Angeles.	Jan. 23, 1888.	2,000	200,000	Serial	*	J. Marchant.
Columbia Loan and Building Association.	Los Angeles.	Feb. 14, 1887.	5,000	1,000,000	Serial	*	A. Willharitz.
East Side Building and Loan Association.	Los Angeles.	July 10, 1887.	2,500	500,000	Serial	Annually	E. A. Weed.
The National City Building and Loan Association.	National City.	Nov. 4, 1887.	5,000	1,000,000	Serial	Annually	Wm. Burgess.

Napa Building and Loan Association.	Napa	April 27, 1886.	6,000	1,200,000	Serial	Annually	F. N. Mount.
Orange Building and Loan Association.	Orange	Sept. 26, 1887.	5,000	1,000,000	Serial	*	E. A. Dian.
Oroville Building and Loan Association.	Oroville						J. V. Coleman.
Home Security Building and Loan Association.	Oakland	July 20, 1875	5,000	1,000,000	Serial	Semi-annually	Chas. K. Clark.
Cosmopolitan Mutual Building and Loan Association.	Oakland East	Aug. 7, 1879	5,000	1,000,000	Serial	Semi-annually	P. F. Morehouse.
West Oakland Mutual Loan Association.	Oakland West	July 21, 1875	3,000	600,000	Serial	Annually	A. Sbarboro.
Pasadena Building and Loan Association.	Pasadena	June 8, 1886.	1,250	250,000	Terminating		T. Coleman.
South Riverside Building and Loan Association.	South Riverside	—, 1887.	5,000	1,000,000	Serial	Annually	F. J. Dyer.
Stockton Land, Loan, and Building Association.	Stockton	Jan. 3, 1887.	2,500	500,000	Serial		R. E. Wilhoit.
San José Building and Loan Association.	San José	Jan. 30, 1885.	7,500	1,500,000	Serial	Annually	H. W. Wright.
Marin County Mutual Building and Loan Association.	San Rafael	July 19, 1886.	5,000	1,000,000	Serial	Annually	J. Christieson.
The Loan Building Association of Santa Barbara.	Santa Barbara	May 23, 1887.	5,000	1,000,000	Serial	*	J. F. Johnson.
San Bernardino Building and Loan Association.	San Bernardino	Jan. 11, 1887.	2,500	500,000	Serial	*	T. A. Hunt.
Santa Ana Loan and Building Association.	Santa Ana	Feb. 8, 1887.	2,000	50,000	Terminating		J. B. Fulkerson.
San Luis Building and Loan Association.	San Luis Obispo	Feb. 13, 1888.	5,000	1,000,000	Serial	Annually	D. M. Meredith.
Sausalito Mutual Loan Association.	Sausalito.	Dec. 1, 1887.	10,000	1,000,000	Serial	Annually	R. George.
San Diego Building and Loan Association.	San Diego.	July 11, 1885.	2,500	500,000	Serial	Annually	T. Tintzelberg.
San Diego Savings and Loan Association.	San Diego	Nov. 11, 1887.	2,500	500,000	Terminating		A. E. Peck.
The Pacific Beach Building and Loan Association.	San Diego.	Jan. 5, 1888.	1,000	200,000	Serial	Semi-annually	
Occidental Building and Loan Association.	Sacramento	Nov. —, 1877.	2,500	250,000	Serial	Annually	E. K. Alsip.
Union Building and Loan Association.	Sacramento	Dec. —, 1874.	2,500	250,000	Serial	Annually	E. K. Alsip.
Germania Building and Loan Association.	Sacramento	Dec. 31, 1872.	20,000	2,000,000	Serial	*	H. J. Goethe.
Mechanics Building and Loan Association.	Sacramento						W. R. Felter.
Sacramento Building and Loan Association.	Sacramento	Aug. 26, 1874.	6,000	600,000	Serial	Annually	A. Leonard.
Visalia Building and Loan Association.	Visalia.	Jan. 5, 1887.	1,000	100,000	Serial	*	Julius Levy.
Woodland Building and Loan Association.	Woodland	June 1, 1886.	1,000	100,000	Terminating		E. T. Clowe.
Totals			261,750	\$17,500,000			

* Fixed by Board of Directors.

N. B.—The First Savings and Loan Society of Oakland has just been organized.

TABLE M M.

II.—Shares, Series, Withdrawals, Etc.

NAME OF ASSOCIATION.	Number of Shareholders.	Number of Shares Issued.	Estimated Time Required to Run Series to Pay—Years.	No. of Series Matured.	No. of Months Oldest Series Has Run.	No. of Months Last Has Run.	Is Cash Paid for Shares Withdrawn.	Rate of Interest Allowed on Withdrawals.
Citizens Building and Loan Association	400	4,500	9 years.	None.	38	2	Yes.	6 per cent.
Commercial Building and Loan Association	150	1,200	10 years.	None.	15	3	Yes.	6 per cent.
California Mutual Savings Fund, Loan, and Building Association	60	444	9 years.	None.	15	3	Yes.	*
Equitable Building and Loan Association	187	500	9 years.	None.	15	2	Yes.	*
Fidelity Building and Loan Association	255	2,605	9 years.	None.	1	2	Yes.	4 per cent.
Franklin Building and Savings Association	134	1,422	6 years.	None.	27	3	Yes.	6 per cent.
Home Mutual Building and Loan Association	200	1,750	10 years.	None.	12	6	Yes.	8 per cent.
Italian-Swiss Mutual Loan Association	175	1,725	10 years.	None.	60	6	Yes.	6 per cent.
Mutual Savings Fund, Building, and Loan Association	224	2,199	9 years.	None.	36	9	Yes.	*
National Home and Loan Association	200	4,796	8 to 9 years.	None.	45	9	Yes.	*
Occidental Loan Association	179	3,629	9 years.	None.	10	6	Yes.	*
Providence Building and Loan Association	76	1,350	9 years.	None.	42	6	Yes.	*
Pacific Loan Association	192	4,582	10 years.	None.	66	6	Yes.	8 per cent.
San Francisco Mutual Loan Association	400	4,854½	9 years.	None.	2	1	Yes.	6 per cent.
Security Loan Association	250	2,200	9 years.	None.	84	7	Yes.	*
Union Loan Association	285	4,111	9 years.	None.	19	6	Yes.	*
Western Loan Association	182	2,718	10 or 11 years.	None.	120	6	Yes.	6 per cent.
Alameda Building and Loan Association	300	2,680	9 years.	None.	3	1	Yes.	6 per cent.
California Building and Loan Association	79	750	9 years.	None.	25	4	Yes.	6 per cent.
The Homestead Loan Association	200	2,400	9 years.	None.	64	4	Yes.	4 per cent.
Benicia Building and Loan Association	120	1,070	8 years.	None.	12	10	Yes.	*
Colton Building and Loan Association	100	500	8 years.	None.	21	3	Yes.	profits.
Fresno Building and Loan Association	221	3,943	6 years.	None.	12	11	Yes.	6 per cent.
Metropolitan Loan Association	150	1,439	9 years.	None.	59	17	Yes.	None.
Southern California Loan Association	184	1,272	8 years.	None.	4	3	Yes.	6 per cent.
Savings Fund, Building, and Loan Association	180	2,000	7 years.	None.	17	4	Yes.	6 per cent.
Union Building and Loan Association	38	227	8 years.	None.	22	3	Yes.	4 per cent.
Columbia Loan and Building Association	90	1,000	8½ years.	None.	10	6 or 7 years.	Yes.	4 per cent.
East Side Building and Loan Association	30	997	8 years.	None.	6	10	Yes.	4 per cent.
The National City Building and Loan Association	131	751	8 years.	None.	10	10	Yes.	4 per cent.
Napa Building and Loan Association	97	751	8 years.	None.	10	10	Yes.	4 per cent.
Orange Building and Loan Association								
Oroville Building and Loan Association								

Home Security Building and Loan Association	500	4,800	9 to 9½ years	4	111	3	Yes.	.4 to 14 per cent.
Cosmopolitan Mutual Building and Loan Association	215	1,931	9 years	None.	---	6	Yes.	6 per cent.
West Oakland Mutual Loan Association	250	2,407	10 years	1	114	6	Yes.	8 per cent.
Pasadena Building and Loan Association	57	400	9 years	None.	---	---	Yes.	6 per cent.
South Riverside Building and Loan Association	20	200	9 years	None.	14	---	*	6 per cent.
Stockton Land, Loan, and Building Association	240	2,319	7 or 8 years	None.	36	1	Yes.	6 per cent.
San José Building and Loan Association	564	5,500	9 years	None.	18	7	Yes.	--- profits.
Marin County Mutual, Building, and Loan Association	98	949	9 years	None.	12	---	Yes.	--- profits.
The Loan and Building Association of Santa Barbara	88	592	9 years	None.	14	4	Yes.	--- profits.
San Bernardino Building and Loan Association	211	500	8 years	None.	---	---	Yes.	--- profits.
Santa Ana Loan and Building Association	75	700	4½ years	None.	6	---	Yes.	--- profits.
San Luis Building and Loan Association	150	1,000	8 years	None.	7	---	Yes.	--- profits.
Sausalito Mutual Loan Association	49	780	6 years	None.	---	---	Yes.	---
San Diego Building and Loan Association	262	2,413	7 years	None.	30	7	Yes.	6 per cent.
San Diego Savings and Loan Association	---	---	5 years	---	---	---	No.	---
The Pacific Beach Building and Loan Association	125	1,000	6 years	None.	1	---	Yes.	6 per cent.
Occidental Building and Loan Association	200	1,861	10 years	1	96	12	Yes.	*
Union Building and Loan Association	300	2,884	10 years	1	108	12	Yes.	7 per cent.
Germania Building and Loan Association	772	7,850	10 years	1	102	17	Yes.	--- profits.
Mechanics Building and Loan Association	---	---	---	---	---	---	---	*
Sacramento Building and Loan Association	368	6,471	10 years	1	118	9	Yes.	---
Visalia Building and Loan Association	97	1,900	7 years	None.	16	9	Yes.	None.
Woodland Building and Loan Association	---	---	6 years	---	---	---	Yes.	None.
Totals	10,080	109,373	---	---	---	---	---	---

* Fixed by Directors.

TABLE N N.

III—Mortgages and Loans.

NAME OF ASSOCIATION.	Number of Loans Made.	Number of Shares Borrowed on.	Amount of Loans Made.	Rate of Interest Charged on Loans.	Average Rate of Premium Bid.	Loans on Gross or Net Plan.	Number of Mortgages Foreclosed.
Citizens Building and Loan Association	95	608	\$121,600 00	7 per cent.	30 per cent.	Net.	None.
Commercial Building and Loan Association	12	100	19,600 00	7 per cent.	{ 18 per ct. gross, 30 per ct. net.	{ Both.	None.
California Mutual Savings Fund, Loan, and Building	3	27	4,000 00	8 per cent.	10 per cent.	Gross.	None.
Equitable Building and Loan Association	32	800	171,810 00	6 per cent.	20 per cent.	Gross.	None.
Fidelity Building and Loan Association	22	341	64,400 00	7 per cent.	15 per cent.	Gross.	None.
Franklin Building and Savings Association	50	1,000	287,800 00	9 per cent.	20 per cent.	Gross.	None.
Home Mutual Building and Loan Association	25	200	39,450 00	7 per cent.	20 per cent.	Gross.	None.
Italian-Swiss Mutual Loan Association	7	100	20,000 00	6 per cent.	16 per cent.	Gross.	None.
Mutual Savings Fund, Building, and Loan Association	50	457	88,350 00	8 per cent.	15 per cent.	Gross.	None.
National Home and Loan Association	30	1,158	194,000 00	7 per cent.	15 per cent.	Gross.	None.
Occidental Loan Association	64	700	221,900 00	7 per cent.	15 per cent.	Gross.	None.
Providence Building and Loan Association	6	87½	15,947 00	7 per cent.	{ 15 per ct. net, 30 per ct. gross.	{ Both.	None.
Pacific Loan Association	51	1,500	308,500 00	7 per cent.	15 per cent.	Gross.	1
San Francisco Mutual Loan Association	160	1,065	213,075 00	6 per cent.	15 per cent.	Gross.	None.
Security Loan Association	2	74	14,800 00	7 per cent.	{ 16 per ct. net, 30 per ct. gross.	{ Both.	None.
Union Loan Association	123	1,068	354,080 00	7 per cent.	12 per cent.	Gross.	3
Western Loan Association	43	700	115,000 00	7 per cent.	30 per cent.	Net.	None.
Alameda Building and Loan Association	287	843	169,124 75	8 per cent.	{ 15 per ct. gross, 30 per ct. net.	{ Both.	3
California Building and Loan Association	None.			8 per cent.	{ 12 per ct. net, 30 per ct. gross.	{ Both.	None.
Homestead Loan Association	66	280	55,680 00	7½ per cent.	30 per cent.	Net.	None.
Benicia Building and Loan Association	54	364	73,050 00	7 per cent.	20 per cent.	Gross.	None.
Colton Building and Loan Association	3	12	2,400 00	12 per cent.	20 per cent.	Gross.	None.
Fresno Building and Loan Association	6	19	3,800 00	8 per cent.	20 per cent.	Net.	None.
Metropolitan Loan Association	47	647	114,250 00	9 per cent.	20 per cent.	Gross.	None.
Southern California Loan Association	10	750	12,981 41	9 per cent.	13½ per cent.	Gross.	None.
Savings Fund, Building, and Loan Association	63	225	25,268 83	8 per cent.	20 per cent.	Net.	None.
Union Building and Loan Association	None.			9 per cent.		Net.	None.
Columbia Loan and Building Association	34	321	64,200 00	8 per cent.	21 to 46 per ct.	Gross.	None.
East Side Building and Loan Association	1	7	1,032 00	9 per cent.	29 per cent.	Net.	None.
The National City Building and Loan Association	2	10	2,000 00	7 per cent.	20 per cent.	Net.	None.

Napa Building and Loan Association.....	9	102	15,150 00	7 per cent.	20 per cent.	Gross.	None.
Orange Building and Loan Association.....	6	30	6,000 00	6 per cent.		Gross.	None.
Oroville Building and Loan Association.....							
Home Security Building and Loan Association.....	360	1,700	330,345 00	9 per cent.	20 per cent.	Gross.	None.
Cosmopolitan Mutual Building and Loan Association.....	51	619½	124,100 00	8 per cent.	1½ per cent.	Gross.	None.
West Oakland Mutual Loan Association.....	337	887	177,501 10	6 per cent.	16 per cent.	Gross.	None.
Pasadena Building and Loan Association.....	5	28	5,000 00	7 per cent.	15 to 29 per ct.	Gross.	None.
South Riverside Building and Loan Association.....	2	20	3,600 00	7 per cent.	20 per cent.	Gross.	None.
Stockton Land, Loan, and Building Association.....	24	314	40,627 98	6 per cent.		Gross.	None.
San José Building and Loan Association.....	127	1,904	180,380 00	6 per cent.	26 per cent.	Gross.	None.
Marin County Mutual Building and Loan Association.....	17	169	27,000 00	7 per cent.	20 per cent.	Net.	None.
The Loan and Building Association of Santa Barbara.....	3	18	3,600 00	9 per cent.	5 to 7½ per ct.	Gross.	None.
San Bernardino Building and Loan Association.....	20	109	16,200 00	7½ per cent.	30 per cent.	Net.	None.
Santa Ana Loan and Building Association.....	10	214	3,850 00	7 per cent.	20 per cent.	Net.	None.
San Luis Building and Loan Association.....	1	4	800 00	7 per cent.	25 per cent.	Both.	None.
Sausalito Mutual Loan Association.....	5	75	7,800 00	8 per cent.	20 per cent.	Net.	None.
San Diego Building and Loan Association.....	79	402	45,030 00	10 per cent.	14 to 36 per ct.	Gross.	None.
San Diego Savings and Loan Association.....	17	90	18,000 00	8 per cent.	20 per cent.	Net.	None.
The Pacific Beach Building and Loan Association.....	1	6	1,200 00	8 per cent.	20½ per cent.	Net.	None.
Occidental Building and Loan Association.....	87	419	200,762 40	7 per cent.	None.	Net.	None.
Union Building and Loan Association.....	130	597	203,054 00	8 per cent.	None.	Gross.	None.
Germania Building and Loan Association.....	297	1,485		10 per cent.	None.	None.	2
Mechanics Building and Loan Association.....							
Sacramento Building and Loan Association.....	916	3,125	162,207 80	10 per cent.	None.	Gross.	2
Visalia Building and Loan Association.....	17	179	19,100 00	10 per cent.	20 per cent.	Gross.	None.
Woodland Building and Loan Association.....	27	40	18,004 50	10 per cent.			1
Total.....	3,806	25,760	\$4,388,251 77				

TABLE O O.
IV—Assets and Liabilities.

NAME OF ASSOCIATION.	ASSETS.						Total Assets.
	Loans on Stock, Mortgages, and Other Security.	Dues, Fines, etc., Owed the Association.	Real Estate.	Cash on Hand.	Office Furniture, etc.	Other Assets.	
Citizens Building and Loan Association.....	\$121,600 00	\$201 00	---	---	\$850 83	---	\$122,651 83
Commercial Building and Loan Association.....	19,900 00	175 50	---	---	261 25	---	20,436 75
California Mutual Savings Fund, Loan, and Building Association.....	4,000 00	90 00	---	---	---	---	5,711 55
Equitable Building and Loan Association.....	171,810 00	1,211 75	---	\$1,621 55	250 00	---	183,790 94
Franklin Building and Savings Association.....	249,400 00	---	---	10,489 19	---	---	250,056 55
Home Mutual Building and Loan Association.....	39,650 00	80 35	---	1,206 55	186 47	\$6,814 00	39,984 96
Italian-Swiss Mutual Loan Association.....	20,000 00	---	---	4,125 51	---	---	24,125 51
Mutual Savings Fund, Building, and Loan Association.....	88,350 00	---	---	2,641 01	30 35	---	91,021 36
National Home and Loan Association.....	194,000 00	565 00	---	---	---	2,300 00	196,865 00
Occidental Loan Association.....	221,900 00	112 60	---	---	---	---	222,012 60
Providence Building and Loan Association.....	15,947 00	---	---	228 60	246 67	---	16,422 27
Pacific Loan Association.....	308,500 00	270 00	---	---	---	3,150 00	311,920 00
San Francisco Mutual Loan Association.....	213,075 00	498 30	---	10,921 41	200 00	888 00	225,582 74
Security Loan Association.....	14,800 00	---	---	---	---	---	14,800 00
Union Loan Association.....	354,080 00	780 00	\$11,156 35	---	930 15	1,000 00	367,946 50
Western Loan Association.....	115,000 00	300 00	---	---	---	---	115,300 00
Alameda Building and Loan Association.....	169,124 75	1,185 80	---	---	193 67	100 42	170,604 64
California Building and Loan Association.....	---	---	---	2,300 00	---	---	2,300 00
Homestead Loan Association.....	55,600 00	---	---	---	299 35	43 00	56,002 35
Benicia Building and Loan Association.....	73,050 00	482 15	---	1,300 00	---	---	74,832 15
Colton Building and Loan Association.....	2,400 00	---	---	824 40	---	113 20	3,337 60
Fresno Building and Loan Association.....	3,800 00	140 00	---	89 45	177 60	---	4,207 05
Metropolitan Loan Association.....	114,250 00	3,477 68	---	4,885 00	---	2,570 82	125,183 00
Southern California Loan Association.....	12,981 41	---	---	1,741 34	---	---	14,722 75
Savings Fund, Building, and Loan Association.....	25,298 83	87 00	---	1,076 40	242 75	---	26,674 98
Columbia Loan and Building Association.....	64,200 00	---	---	2,000 00	300 00	---	66,500 00
East Side Building and Loan Association.....	1,032 00	1,546 00	---	35 75	110 85	42,732 00	45,456 60
Napa Building and Loan Association.....	15,150 00	---	---	3,621 82	---	---	18,771 82
Home Security Building and Loan Association.....	330,345 00	2,524 90	---	---	986 67	1,292 60	335,449 17
Cosmopolitan Mutual Building and Loan Association.....	124,100 00	1,721 20	1,136 00	5,742 11	592 50	---	133,291 81
West Oakland Mutual Loan Association.....	177,501 10	630 80	---	98 27	656 00	1,408 66	180,294 83

Stockton Land, Loan, and Building Association.....	40,627 98	-----	-----	2,310 23	-----	-----	42,938 21
San José Building and Loan Association.....	180,380 00	-----	-----	2,303 10	-----	-----	183,353 10
Marin County Mutual Building and Loan Association.....	27,000 00	11 00	-----	-----	670 00	-----	27,186 91
The Loan and Building Association of Santa Barbara.....	3,600 00	-----	-----	288 60	-----	145 50	4,044 10
San Bernardino Building and Loan Association.....	16,200 00	-----	-----	213 50	-----	-----	16,413 50
Santa Ana Loan and Building Association.....	3,850 00	162 00	-----	982 53	-----	20 70	5,015 23
San Diego Building and Loan Association.....	45,080 00	1,574 52	-----	-----	517 35	1,961 46	48,565 98
Occidental Building and Loan Association.....	200,762 40	1,153 00	3,400 00	5,955 52	607 50	7,072 23	218,800 50
Union Building and Loan Association.....	203,054 00	657 18	6,049 04	1,460 90	-----	6,553 03	218,381 65
Germania Building and Loan Association.....	145,974 47	-----	-----	2,373 75	300 00	9,472 00	157,820 22
Sacramento Building and Loan Association.....	162,207 80	2,770 22	2,700 07	8,315 01	-----	1,205 50	177,618 60
Visalia Building and Loan Association.....	14,100 00	38 70	-----	641 48	-----	-----	14,780 18
Woodland Building and Loan Association.....	18,064 50	1,493 19	753 20	44 02	-----	805 64	21,220 55
Totals.....	\$4,386,426 24	\$23,939 84	\$25,254 06	\$79,847 03	\$8,835 87	\$83,022 40	\$4,407,326 04

TABLE OO—Continued.

NAME OF ASSOCIATION.	LIABILITIES.			
	Overdraft.	Capital Stock.	Profits.	Other Liabilities. Total Liabilities.
Citizens Building and Loan Association.....	\$9,512 10	\$83,501 00	\$16,305 08	\$3,333 65 \$122,651 83
Commercial Building and Loan Association.....	5,605 61	10,893 00	789 99	2,745 15 20,026 75
California Mutual Savings Fund, Loan, and Building Association.....	.....	8,594 00	299 55	1,818 00 5,711 55
Equitable Building and Loan Association.....	.....	150,300 00	27,751 72	5,593 22 183,794 94
Franklin Building and Savings Association.....	.....	250,656 55	.....	250,656 55
Home Mutual Building and Loan Association.....	5,800 99	24,708 00	3,479 79	5,996 18 39,984 96
Italian-Swiss Mutual Loan Association.....	.....	21,295 00	2,830 51	24,125 51
Mutual Savings Fund, Building, and Loan Association.....	.....	66,798 00	15,877 75	8,345 61 91,021 36
National Home and Loan Association.....	20,227 92	129,492 00	27,145 08	20,000 00 19,885 00
Occidental Loan Association.....	77,987 00	124,744 00	19,281 00	222,012 00
Providence Building and Loan Association.....	3,616 49	12,150 00	655 78	16,422 27
Pacific Loan Association.....	86,807 00	168,480 00	506 33	311,929 00
San Francisco Mutual Loan Association.....	.....	174,905 00	50,977 74	225,582 74
Security Loan Association.....	12,600 00	2,200 00	.....	14,800 00
Union Loan Association.....	66,759 79	219,803 99	70,377 72	397,946 50
Western Loan Association.....	57,700 00	47,352 00	4,944 00	115,300 00
Alameda Building and Loan Association.....	1,290 07	120,919 50	38,497 81	170,604 64
California Building and Loan Association.....	.....	2,300 00	.....	2,300 00
Homestead Loan Association.....	8,989 79	38,154 00	5,970 71	56,002 35
Benicia Building and Loan Association.....	.....	52,226 00	22,006 15	74,832 15
Colton Building and Loan Association.....	.....	2,500 00	532 60	3,337 60
Fresno Building and Loan Association.....	.....	4,000 00	160 00	4,267 05
Metropolitan Loan Association.....	.....	47,084 44	16,819 01	61,279 55
Southern California Loan Association.....	.....	12,344 00	2,378 75	14,722 75
Savings Fund, Building, and Loan Association.....	.....	18,180 00	7,099 89	1,395 09 26,674 98
Columbia Loan and Building Association.....	.....	64,122 87	1,377 13	1,000 00 66,500 00
East Side Building and Loan Association.....	.....	45,400 00	56 60	45,456 60
Napa Building and Loan Association.....	.....	15,691 00	3,080 82	18,771 82
Home Security Building and Loan Association.....	.....	214,968 00	104,397 70	335,149 17
Cosmopolitan Mutual Building and Loan Association.....	10,307 24	100,000 00	19,934 89	13,356 92 180,294 83
West Oakland Mutual Loan Association.....	.....	141,150 14	39,144 69	180,294 83
Stockton Land, Loan, and Building Association.....	.....	27,773 00	11,156 21	4,009 00 42,938 21
San José Building and Loan Association.....	.....	125,953 00	55,124 40	183,353 10
Marin County Mutual Building and Loan Association.....	.....	1,235 84	1,110 00	2,718 61
The Loan and Building Association of Santa Barbara.....	11,557 07	3,703 00	332 30	8 80 4,044 10
San Bernardino Building and Loan Association.....	.....	11,880 00	4,533 50	16,413 50

Santa Ana Loan and Building Association	-----	-----	4,850 00	157 23	8 00	5,015 23
San Diego Building and Loan Association	-----	-----	40,000 00	8,565 98	-----	48,565 98
Occidental Building and Loan Association	-----	-----	200,000 00	15,000 00	3,800 50	218,800 50
Union Building and Loan Association	-----	-----	180,000 00	38,381 65	-----	218,381 65
Germania Building and Loan Association	-----	-----	128,243 06	29,577 16	-----	157,820 22
Sacramento Building and Loan Association	-----	-----	100,000 00	77,618 60	-----	177,618 60
Visalia Building and Loan Association	-----	-----	16,000 00	3,780 18	-----	19,780 18
Woodland Building and Loan Association	-----	-----	16,166 00	1,868 46	-----	21,220 55
Totals	-----	-----	\$3,245,671 55	\$806,737 57	\$172,969 76	\$4,007,326 04
		\$381,947 16				

CHAPTER II.

COÖPERATIVE FARMING.

Coöperative farming, in its experimental stage, has met with glowing success in California. Such schemes have often been introduced, from time to time, as an experiment to elevate and place the wage classes on a higher plane of social comfort, but met with ill success. The wage classes are fast becoming cognizant of that old, but true, adage, "A penny saved is a penny earned." They are taking care of the dimes, leaving the dollars to take care of themselves. Organization has done a great deal in educating them to look beyond their present necessities, to lay by in the balmy days of prosperity what will cheer the domestic circle and add vigor to hope in times of adversity. Building and loan associations have done much towards solving the great industrial problem. Coöperative farming is helping in the same direction.

In 1881 Mr. Andrea Sbarboro, the Secretary of several mutual loan associations, seeing the great success attained in this State by coöperative banking, through the mutual loan associations, after much thought, conceived the idea that like success should be achieved by coöperative farming. He consulted some of his friends, whom he found to favor his plans, and finally organized the Italian-Swiss Agricultural Colony, and adopted the following by-laws, which are on the same principle as those of building and loan associations, with the difference that instead of loaning money out to the members, it is employed in purchasing large tracts of land and improving them, for account of all the members concerned.

HOW THE ASSOCIATION WAS FORMED.

One hundred members joined the association, taking fifteen hundred shares of stock, upon which was paid \$1 per share per month, making the monthly receipts \$1,500. As soon as \$10,000 was in the treasury a committee was appointed to select a tract of land adapted to the purposes of the colony. The committee traversed the whole State, examined some fifty pieces of property, and finally selected a tract of fifteen hundred acres bordering on the Russian River, four miles south of Cloverdale, Sonoma County, and on the line of the San Francisco and North Pacific Coast Railroad, where there was a station named Asti. The price paid was \$25,000, of which amount \$10,000 was paid in cash, and a mortgage given for the balance of \$15,000. A superintendent was appointed and work commenced in earnest; \$1,000 a month was used in improving the land, and \$500 a month set aside as a sinking fund with which to pay off the mortgage. At the end of five years, when all the shares issued had been paid up in full, at the rate of \$60 each, or \$90,000 in all, the colony had paid off its mortgage and had under cultivation five hundred acres of choice varieties of foreign grapevines, one hundred acres of fruit trees, two hundred acres in corn, grain, potatoes, vegetables, etc. At this time the corporation was entirely free from debt, and owned as fine a tract of land, of its size, as there was in the State. The improvement of the land was continued, and in 1887 one of the finest concrete wineries in the State was built by the colony. In order to pay for the same, without going in debt, seven hundred and fifty shares of new stock were issued, which were all readily taken by the members themselves, in proportion to the number of shares which they owned. In the season of 1887 the colony made one hundred

and thirty thousand gallons of wine. The season of 1888 will probably produce over a thousand tons of grapes and one hundred tons of fruit. When all the vines and fruit trees now set out come into full bearing, it is expected that the yearly produce will be over four thousand tons of grapes and one thousand tons of choice fruit. In a few years more the property of the colony will have a value of over \$1,000,000. One hundred acres of land have been set aside near the railroad depot for a town site. Each member, besides being interested in the whole tract, will be allotted a town lot, which may in time become very valuable property. The great success obtained by the colony is due to its honest and efficient management. The Board of Directors take a pride in the institution, and gratuitously devote a great deal of their valuable time to its affairs. Thus it will be seen that coöperative farming, the great idea of Horace Greeley, can be made successful.

Similar attempts have failed on account of bad management. Most of the schemes have been organized by persons interested in the sale of tracts of land, at three or four times the actual value, thus discounting the future for many years to come. But if a number of honest persons, with honest intentions, join together, pay into a general fund so much a month, and, as soon as a respectable sum is accumulated, purchase a tract of land at, or under if possible, its actual value, then appoint competent persons to manage the institution, coöperative farming, as well as coöperative banking, stores, and manufactories, may be made as successful as the Italian-Swiss Agricultural Colony.

OBJECTS OF THE ASSOCIATION.

The objects of the association are set forth in the following articles taken from the laws made by the members, which give an idea of how to form a similar one:

NAME AND OBJECT.

This association shall be known as the Italian-Swiss Agricultural Association, and its objects shall be to buy and sell agricultural land for colonial and other purposes, or cultivate the same, and to manufacture, buy, and sell wines and spirits, to deal in the products of the said lands, and all matters and things appertaining to the purposes herein specified. Its principal office shall be in the City and County of San Francisco.

ARTICLE II.—CAPITAL—SHARES.

The capital is established at \$300,000, divided into five thousand shares, of the par value of \$60 per share; and each and every shareholder, for each and every share of stock he or she may take, shall pay the sum of \$1 in gold coin, on the first Tuesday in each and every month, to the Secretary, for the period of sixty months—unless the association should be remunerative previously—in which event the Board may order the cessation of the payments. The shares may be issued in series and at different periods, as may be ordered by the Board of Directors.

ARTICLE III.—MEMBERS.

SECTION 1. Each member shall be entitled to a certificate for the number of shares of stock held by him or her, which shall not be less than five nor more than fifty, to be issued in the name of and under the seal of this association, signed by the President and attested by the Secretary.

SEC. 2. Each person, upon receiving a certificate of stock to which he or she may be entitled, shall subscribe to an agreement to comply with and obey all the by-laws and rules of this association.

SEC. 3. Transfers of stock can only be made upon the books of the association by assignment in person or by attorney, on the payment of 10 cents per share, and such transferee shall become a member of the association, and shall be subject to the rules and regulations thereof; but no shareholder shall be entitled to more than one vote.

ARTICLE IV.—FINES.

Any stockholder who shall neglect or refuse to pay his or her monthly installments shall pay a fine of 10 per cent per month upon the amount of his or her indebtedness on his or her stock. This fine shall be charged by the Secretary, and be paid with the delin-

quent monthly dues; and in case any shareholder shall neglect or refuse to pay his or her monthly dues or fines for the space of six months, the Treasurer shall demand a return of the certificate of stock, and shall tender such stockholder the amount actually paid in, deducting all fines and forfeitures that may be charged against him or her, and from that time he or she shall cease to be a member of this association; and the shares held by such defaulting member shall revert to the association, and may be sold by the Board of Directors, as they may deem advisable, for the interest of the association, but in no case at less rate than the actual amount paid in for each share.

CHAPTER III.

STANFORD ON COÖPERATION.

The great advantage to labor arising out of coöperative effort has been apparent to me for many years. From my earliest acquaintance with the science of political economy, it has been evident to my mind that capital was the product of labor, and that, therefore, in its best analysis there could be no natural conflict between capital and labor, because there could be no antagonism between cause and effect—between effort and the result of effort; and, since capital is the product of labor, there could be no conflict between labor and its product. Keeping this fundamental principle in view, it is obvious that the seeming antagonism between capital and labor is the result of deceptive appearance. I have always been fully persuaded that, through coöperation, labor could become its own employer. The investment and employment of capital is dependent entirely upon the product of the labor employed by it. All active capital is merely capital employing labor. It is out of the product of labor so employed that capital is rewarded. Capital invested in a manner not to require the employment of labor is dead or idle capital. Money invested in land, where the land is not cultivated, or in buildings which are untenanted, is as idle as if the gold and silver invested in them had never been mined; but all capital employed in manufactures, in agriculture, in commerce, in arts, in transportation, is active capital, and it is sustained and supported in activity wholly out of the result of the labor it employs. Labor and capital thus associated, then, create all the reward which inures to them.

All things have value in proportion to their susceptibility of becoming valuable by the addition of labor. The ore in the mine has value only because of its capability of being converted by the application of labor, under the direction of enterprise, into things useful to man. Land is valuable only in proportion as it is capable of yielding to the labor expended upon it a return in the way of products adapted to supply human wants. The value of everything in the way of raw or unwrought material depends entirely upon its susceptibility of being converted into property, and the conversion of the original raw materials into property, in the way of wares, merchandise, fabrics, or works of art, resides wholly in their capability, under the manipulation of labor, of being so converted.

WEALTH THE PRODUCT OF LABOR.

Thus again we find the wealth of the world to be in the product of labor. Labor is the creator of capital, and capital is in the nature of a stored up force. It is like the balance wheel of an engine, which has no motion that has not been imparted to it, but is a reservoir of force which will perpetuate the motion of the machinery after the propelling power has ceased. A man takes a few thousand dollars of capital, builds a work-

shop, buys raw material advantageously, and engages a hundred workmen to manufacture boots and shoes. This is the foundation of enterprise. The employer of labor is a benefactor. The great majority of mankind do not originate employments for themselves. They either have not the disposition or the ability to so originate and direct their own employment. Whatever may be the fault, it is true that the majority of mankind are employed by the minority.

Capital directed by intelligent enterprise is a vast benefactor to man. The man who, through others, makes to grow two blades of grass where but one grew before, is a benefactor to mankind in the largest sense; but suppose that each of the one hundred workmen employed produce, in excess of his wages, the value of \$1 per day. One dollar a day for each, aggregated, gives \$100 a day to the employer. The profit to the employer, then, is \$100 per day. In the aggregate the one hundred men employed, by associating their effort and their credit, and possibly their capital, could command a sufficiency of that reserve force which we call capital to build the shop and purchase the material with which to start business. If they do not possess the capital in the aggregate, I am fully persuaded that one hundred industrious, sober, skillful mechanics, agreeing to combine their labor, industry, and intelligence, would possess sufficient credit to command the capital necessary to lay the foundation of enterprise. As between this outline of coöperation and the old system of permitting labor to be hired and directed by one who, in the prosecution of beneficial enterprise, originates employment for these one hundred men, there is a difference in favor of coöperation of \$100 a day, that amount being the premium which the one hundred men used in this illustration would pay to some one else for originating their employment and directing their skill.

It should be borne in mind that the labor employed not only creates its own wages, but creates the premium which the enterprising proprietor receives for originating the employment. Viewed from this standpoint there is a sense in which the labor so coöperating is hiring an employer—that is, it is paying a premium to enterprise to originate and direct its employment.

VALUE OF COÖPERATION.

Capital is paramount, and labor subordinate, only because labor consents to that form of organization in our industries which produces that result. The value of coöperative effort has had many practical illustrations, some of which have come under my observation. In the early history of mining in California, some of the largest and most profitable mining enterprises were projected and carried on by association alone. A large number of men possessed of productive capacity, but without capital, combined into coöperative relation an energy and ability equal to the accomplishment of the work in hand. The work to be done required so many days of labor. By their association they contributed to a common fund, as it were, a laboring capacity equal to the work to be accomplished. If these enterprises had been projected by a single capitalist, the first step would have been to engage an amount of labor necessary to the accomplishment of the work—that is, to purchase the labor. Instead, therefore, of selling the labor to a single far-sighted and enterprising employer, these men contributed by subscription the amount of labor required to be performed. The work accomplished in this way gave all the result attained to the labor expended upon it.

Undertakings of great magnitude are more profitable than the more inconsiderable enterprises, because the greater undertakings require greater

aggregations of capital, and the possession of large capital is enjoyed but by few. There is no undertaking open to capital, however great the amount involved, that is not accessible to a certain amount of labor voluntarily associated and intelligently directing its own effort. When an individual employs one hundred or one thousand men in the manufacture of wares, in the construction of buildings, or in the prosecution of any kind of enterprise, he has in fact formed an association of labor. The efforts of the men employed are associated in the accomplishment of any desired result, and it is out of the result of such effort that all the wages and all the premium to the employer are to be produced.

LABOR FROM A CAPITAL STANDPOINT.

The employers of labor are the greatest benefactors to mankind. They promote industry; they foster a spirit of enterprise; they conceive all the great plans to which the possibilities of civilization invite them; and the association of laboring men into coöperative relation, which in a large measure can take the place of the employer class, must therefore of necessity be ennobling.

There is a mischievous belief among laboring people that enterprises with large backing of capital offer a better guaranty of employment. This is not true. The only guaranty of employment is its profitability. Capital cannot afford continued employment to labor at a loss. Unless the product of the labor yields a sufficient return out of which wages may be paid, and the enterprise and skill of the employer properly rewarded, and the use of the capital also rewarded, the enterprise will of necessity be abandoned. In short, coöperative association for the prosecution of any undertaking stands in exactly the same relation—possesses precisely the same chances of success, if the effort is as intelligently directed, as do the same kind of enterprises projected by individuals and sustained by capital.

As between the two great plans, the coöperation of labor, or the employment of labor by itself, and the hiring of labor for wages, or employment of labor by enterprise, intelligence, and capital, the latter has no advantage over the former in the way of a guaranty as against loss. The product of labor alone insures its employment, because employment of labor cannot continue beyond the point at which it is profitable. In the aggregate, labor produces all the money paid back to it in wages, and all the margin of profit which inures to the employer. It is preëminently right and just that the employers of labor, and capital employed in producing activity, should be rewarded. Labor owes a continuing debt of gratitude to the enterprise and intelligence of the employer class. The thought, attention, intelligence, and skill necessary to originate profitable labor, is in fact a separate department of human activity.

TIME ARRIVED FOR COÖPERATION.

In past times, when labor was less intelligent than now, when the opportunities for education among workingmen were more restricted and limited than at present, an intelligent employer class originating and directing labor was indispensable. What I believe is, the time has come when the laboring men can perform for themselves the office of becoming their own employers; that the employer class is less indispensable in the modern organization of industries, because the laboring men themselves possess sufficient intelligence to organize into coöperative relation and enjoy the entire benefits of their own labor. Whenever labor is sufficiently intelli-

gent to do this, it should not wait patiently for its own employment by capital and enterprise, because whoever is competent to furnish himself employment, and therefore receive the full result of his own effort and hires out his time, is thereby rendering a voluntary servitude to capital, and every man possessed of industrial capacity is in possession of capital, for it is out of that industrial capacity that capital is sustained in activity.

Sufficient productive capacity may be associated for the prosecution of almost any enterprise, however great its magnitude, because, as we have already seen, the employment of labor by capital is in a sense a form of associating labor in the prosecution of undertaking, the difference being that voluntary association of labor into coöperative relation secures to itself both the wages and the premium which, under the other form of industrial organization, would be paid to the enterprise directing it and to the capital giving it employment. Capital appears to have an ascendancy over labor, and so long as our industries are organized upon the divisions of employer and employé, so long will capital retain that relation, but associated labor would at once become its own master.

DISTRIBUTION OF WEALTH.

The political economists and the communists have much to say concerning the distribution of wealth. They are constantly declaring that while our country presents the spectacle of a government wherein there is an equal distribution of political power, there is a great disparity of condition with reference to the possession of wealth. Many writers upon the science of political economy have declared that it is the duty of a nation first to encourage the creation of wealth; and second, to direct and control its distribution. All such theories are delusive. The production of wealth is the result of agreement between labor and capital, between employer and employed. Its distribution, therefore, will follow the law of its creation, or great injustice will be done. The individual who comes to you claiming that, because you have more than himself, you should divide a part of it with him, is claiming a percentage in your manhood, a share in your productive capacity. He is denying to you the right to produce, either with your own labor, as you have a right to do, or through the employment of the labors of others, which you have an equal right to do, more than a bare substance for yourself. The only distribution of wealth which is the product of labor, which will be honest, will come through a more equal distribution of the productive capacity of men, and the coöperative principle leads directly to this consummation.

All legislative experiments in the way of making forcible distribution of the wealth produced in any country have failed. Their first effect has been to destroy wealth, to destroy productive industries, to paralyze enterprise, and to inflict upon labor the greatest calamities it has ever encountered. So long as labor, which is sufficiently intelligent to originate its own employment, consents to a voluntary servitude of paying a premium to those who do originate its employments, so long will the many remain comparatively poor. As at present organized, the industries of the world are under the direction of employers. A man may possess industry and productive capacity and skill, but he must first make an agreement with an employer before he can make these qualities valuable to himself.

INTELLIGENT LABOR ABLE TO TAKE CARE OF ITSELF.

When the lord of the vineyard, at the eleventh hour of the day, found the idlers in the market place, and questioned them concerning the reason

of their idleness, the reply was: "Because no man hath hired us." They were waiting, just as a very large percentage of the laboring world has waited, for some one else to open avenues of employment. But aggregated into coöperative relation, intelligent, educated labor possesses the capacity for the accomplishment of any undertaking or enterprise, and need not wait for an individual called an employer to associate its effort, and direct and control the industry out of which it earns wages and pays premium to capital. Under the present organization of our industrial system, it is idle to say that the men in the market place could have found something to do. It is equally idle to say that there was a conflict between their interest and those of the lord of the vineyard who gave them employment. He was in that instance their benefactor. But intelligent labor need not wait until some man has hired it. It can by coöperation employ itself. There are mills and factories and workshops employing large numbers of skilled hands, wherein the capital employed is far less than the aggregate of money owned and controlled by the operatives, and yet the operatives by their own voluntary consent are dependent for employment entirely upon the thought, the intelligence, and the enterprise of an employer. It cannot be denied that they receive a rate of wages calculated upon the basis of a productive industry which will create the wages paid to them, and also create a profit to the capital and enterprise employing them. There is no natural conflict between capital and labor even in this relation. There is no conflict between the capital invested in the plant of a manufactory, and the raw material upon which the labor is expended, on the one side, and the labor itself on the other, because the plant and material are themselves the product of labor. The real conflict, if any exists, is between the two industrial systems. Labor desires that the premium paid for its employment shall be small. If it could succeed in eliminating that premium altogether, it will leave no encouragement to the employer class, and, as we have already seen, under the present system the employer class is not only indispensable, but is a great benefactor. If, however, there were no profit whatever to the employer class, then practical coöperation would be realized.

LABOR ITS OWN EMPLOYER.

When, therefore, men ask for higher wages, and demand that the margin of profit to the employer shall be less, they are really demanding a nearer approach to the realization of coöperation. The country blacksmith who employs no journeyman is never conscious of any conflict between the capital invested in his anvil, hammer, and bellows, and the labor he performs with them, because, in fact, there is none. If he takes in a partner, and the two join their labor into coöperative relation, there is still no point at which a conflict may arise between the money invested in the tools and the labor which is performed with them; and if, further in pursuance of the principle of coöperation, he takes in five or six partners, there is still complete absence of all conflict between labor and capital. But if he, being a single proprietor, employs three or four journeymen, and out of the product of their labor pays them wages, and, as a reward for giving them employment and directing their labor, retains to himself the premium, which they, in fact, also create, and which justly belongs to him, the line of difference between the wages and the premium may become a disputed one; but it should be clearly perceived that the dispute is not between capital and labor, but between the partial and actual realization of coöperation. The partnership relation was an actual realization of coöperation; the

employed relation is a partial realization of coöperative effort. As intelligence has increased and been more widely diffused among men, greater discontent has been observable, and men say the conflict between capital and labor is intensifying, when the real truth is, that by the increase of intelligence men are becoming more nearly capable of coöperation. In a still higher state of intelligence this premium will be eliminated altogether, because labor can and will become its own employer through coöperative association.

BENEFITS TO CHARACTER.

In addition to the many advantages which coöperation confers upon the material prosperity of the laboring classes, there are great and significant benefits to ensue to the character of men. The employé is regarded by the employer merely in the light of his value as an operative. His productive capacity alone is taken into account. His character for honesty, truthfulness, good moral habits, are largely disregarded unless they interfere with the extent and quality of his services. But when men are about to enter partnership in the way of coöperation, the whole range of character comes under careful scrutiny. Each individual member of a coöperative society, being the employer of his own labor, works with that interest which is inseparable from the new position he enjoys. Each has an interest in the other; each is interested in the other's health, in his sobriety, in his intelligence, in his general competency, and each is a guard upon the other's conduct. There would be no idling in a coöperative workshop. Each workman, being an employer, has a spur to his own industry, and also has a pecuniary reason for being watchful of the industry of his fellow workmen.

The character of men invariably arises with the assumption of higher responsibilities, and with the accession of men to the higher plane of becoming their own employers, there is to be a corresponding accession of more ambitious and interested activity and higher character. The bill I have introduced in the Senate of the United States, if it should become a law, in addition to the opportunity it would afford for the formation of coöperative societies, would do much to attract attention to the value of the coöperative principle upon which our industrial systems should be founded. It will be a governmental attestation of the value of the coöperative principle, which alone can eliminate what has been called the conflict between capital and labor.

INFLUENCE ON WAGES.

There are still higher considerations connecting themselves with this great subject. Take, for instance, the influence of coöperation upon the rate of wages to the employed class. In a coöperative association conducting a business, and dividing the entire proceeds of the business, the dividends so created would exceed the ordinary rate of wages. The best mechanics and the best laborers would, therefore, seek to acquire a position in a coöperative association. The reward of their labor being greater by coöperation, the employer would have to offer additional inducement to labor to remain in its employ, because the superior attractiveness of the coöperative plan would incite them to form societies of this character, and employ their own labor. It would, therefore, have a direct tendency to raise the rate of wages for all labor—or, in other words, to narrow the margin between the amount paid for labor and its gross product. Its effects expand in various

directions by contemplation. There would be a greater consumption of labor, because of the greater prosperity of men in coöperative relation.

All men labor to gratify their wants. Civilization means simply multiplicity of want, and the wants of men are limited only by their intellectual capacity to perceive them. As the mind grows and expands it perceives new and varied wants. You cannot have failed to notice that in proportion as men are able to gratify the higher tastes, their dwellings begin to show the improvement in their condition. They have better carpets, musical instruments, pictures, and books; comforts, and even elegancies, appear with the ability of men to purchase them. All these things are the result of labor. If there are more men able to own and enjoy them, there is a greater demand for labor in their production. So the demand for labor increases continually with the growth of civilized conceptions.

ADVANCE IN COMFORTS AND KNOWLEDGE.

Every improvement in the method of production brings some article of comfort or elegance within the reach of a larger number of people, and makes a greater demand for labor in its production, and at this point the interdependence of all men comes into view. A man may own a piece of land, but he is dependent upon the labor of others for the instruments with which to till it. The owner of a piece of land who has nothing but his hands with which to cultivate the soil is powerless to make it productive. Take the most primitive agricultural implement, a spade. When his hands are supplemented and aided by a spade, he may stir the ground and plant something. This he could not do were his hands not supplemented with tools, and these tools, you will observe, are the product of the labor of others. A spade is a very simple garden implement, but its history would be the history of civilization—a history of all the progress that has been made in the mechanical arts. From the mining of the ore through its melting, its conversion into steel, its manufacture into the form of an agricultural implement, there are many processes, and these processes represent the advancement of thought and skill in the mechanical world.

But the man I have supposed to own the land is powerless without the assistance of others. He cannot make a movement in the way of tilling his land without setting some one else to work to manufacture implements with which that tillage shall be done.

In every branch of human thought, every other department of activity and industry is called into requisition. The musician who composes music must express it upon a musical instrument—a piano or violin—and the instrument is the result of mechanical skill. As that skill advances, new expressions become possible, and hence the science of music is constantly promoted by reason of the improvement in the mechanical construction of musical instruments. The astronomer must use mathematical instruments. The observatory of the astronomer is called into requisition, and with it all the mechanical arts made use of in its construction, from the lense of the telescope to the stone in the foundation of the building. Taken as a whole, society is a grand coöperative association. As a whole, it is a unit, and this unit is divided into departments or branches of mechanical activity and scientific inquiry, and these are mutually dependent upon each other.

DEMAND FOR LABOR UNLIMITED.

The demand for the product of labor is unlimited. There can be no such thing as overproduction, so long as there remains a single human

being with wants to supply. I say the demand for labor is unlimited, because the capacity of the human mind to conceive new wants is unlimited. With every advancement in civilization there is a corresponding enlargement of the range of wants. Every year introduces something into the wants of man which requires activity in a new field of labor to supply. The earth, the source from which all wants are supplied, is an inexhaustible mine. We have, then, the unlimited advancement and extension and multiplicity of human want, and we have an unlimited source from which those wants may be supplied. The condition of labor rises with the advancement of civilization, because with multiplicity of wants the demand for labor increases, and wants advance in proportion as they may be supplied.

The human mind ceases to demand things that are impossible of gratification. But with the possibility of supplying wants they come into existence, and with them new fields of activity for human labor are opened. It is for this reason that labor-aiding machinery is a continued blessing to labor. In fact, the difference between the civilized and uncivilized man is a difference of the extent to which the hand of man has been supplemented by tools and implements. The Indian on the plains of Nevada, with his unaided hand, presents no evidence of civilized capacity or productive power. With him the primitive problem of sustaining existence has not been solved. His hand is not supplemented by tools and implements, and his unaided hand finds constant employment in obtaining the mere necessities of physical existence. It is therefore impossible for him to enter any higher realm.

DIFFERENCE BETWEEN THE UNCULTIVATED AND CIVILIZED.

The use of tools and implements which eventually expand and broaden and multiply into the most complex labor-aiding machinery, is the point of departure between barbarism and civilization. As soon as uncivilized man perceives the value of an ax with which to cut down the trees of the forest, he finds eventually the value of a saw. He learns to propel this saw with steam or water power, and thus his hand is aided. He can now do something more than sustain mere physical existence. Some of the intellectual wants of his nature may now be supplied, and with the intellectual activity necessary to the manufacture of an ax, or a saw, or a spade, he has acquired more intellectual force and power, and this is inseparable from the acquirement of diversified wants. His capacity to perceive new wants has been enlarged, and as soon as a want is perceived or felt, effort will be made to supply it.

The uncivilized man, like the Indian of the plains, has never felt higher wants. When his physical wants are gratified, he falls into a condition of sloth and indolence, if indeed he has time for indolence, for in a barbarous condition, with the hands unaided by implements, it requires constant effort, diligence, and industry to obtain the means of supporting mere physical existence. It therefore follows that every discovery in economic science which makes the production of things useful to man cheaper, and every new want that is felt by man in his progress toward higher civilization, enlarges the field of labor.

Coöperation will add new energy to civilized life, because it will increase the prosperity of laboring men, and enlarge in every respect the scope of their lives. The capacity to perceive a diversity of wants, the power of the mind to feel and acquire new wants, being unlimited, and the things necessary to their gratification being produced alone by labor, the demand

for labor is limitless, and that demand will increase in the proportion as men have capacity to perceive a greater diversity of want. The untaught barbarian, notwithstanding the effort required of him to maintain physical existence, consumes but little labor. Civilized man is a vast consumer of labor. Every article of furniture in his house, the house itself, the garden, the grounds, the books, the papers, and the musical instruments, are all the result of labor, and each civilized man is therefore consuming in his lifetime the result of a labor equal to the productive capacity of many hundreds of men, whose hands are unaided by labor-aiding machinery.

COÖPERATION MEANS PROGRESS.

The introduction of the coöperative principle into the industrial systems of our country means a general advance in the conditions of all classes. It means the awakening in the minds of a greater number of people of the complex wants of civilization, and will bring within the reach of all increased means of their gratification.

[At this point the reporter directed the Senator's attention to the theory advanced by certain writers on the science of political economy concerning the increase of poverty with the advancement of civilization. The question was propounded in the following general form:

"It has been contended, Senator, that the multiplicity of civilized wants places a strain upon certain classes among civilized men who have not sufficient intellectual capacity to keep pace with the civilization which surrounds them, and that they are therefore relegated to a condition of poverty which gives great emphasis to the disparity of condition between the rich and the poor, that in short, civilization presents the strong lights and shadows of great luxury and abject poverty."

To this the Senator replied substantially as follows:]

That conclusion grows out of our lack of observation of the same phenomena among uncivilized men. In a state of barbarism there is an utter absence of all unselfish helpfulness. The strong prey upon the weak. There is a greater disparity of condition between the hunter who is able to pursue the chase, and the indigent, aged, and infirm, than between the rich and the poor in civilized life, and for reasons which have already been alluded to; that is, we have found that the point of departure, the very line of separation which leaves barbarism on one side and introduces civilization on the other, is at that point where the hand of man is supplemented by labor-aiding machinery, tools, and implements. We have found that with the introduction of labor-aiding machinery life is enlarged, its possibilities widened and expanded. The primitive problem of maintaining physical existence being solved, the intellectual and spiritual wants of man may be ministered unto.

CAPACITY OF EDUCATED LABOR.

When man, through the assistance of labor-aiding machinery, may be able to produce in his lifetime an amount sufficient to maintain the physical existence of a hundred men, then he has a margin of capacity to supply his intellectual, esthetic, and spiritual wants in excess of the demand made upon him to maintain his physical existence equal to that which would maintain the physical existence of ninety-nine men. Out of this surplus he is at liberty to conceive new wants, because the means to gratify them are within his reach. Now, among the natural wants of man is the desire to see those around him happy. In a state of barbarism the demand made upon the energy of one whose hand is not supplemented by imple-

ments is such as to confine him to the solution of the problem of his own existence. He has no surplus capacity which he may generously devote to the assistance of others. His own existence is at all times precarious. He does not add to the productive capacity of the soil by tillage. He subsists, for example, upon roots and berries which are allowed to grow, and his method of treating this natural food is such as to reduce its production year by year. For meat he subsists upon the animals of the forest, chiefly animals of the cervine species, and it is a fact of universal observation that the barbarian slays the game at such time as to reduce their numbers. Barbarism, then, adopts and pursues methods of subsistence which constantly diminish the capacity of the earth to sustain human life. Civilized methods constantly increase the capacity of the earth to produce things necessary to man.

Improved methods of cultivation may render a single acre capable of producing an amount of human food equal to that produced by twenty acres in the past. The Malthusian theory of population, with which every student of political economy is familiar, predicted a limitation upon the numbers of the race by assuming a ratio of increase between the food product and the increase of population. It contended that population increased in a geometrical ratio, while the food product increased only in an arithmetical ratio, and that, therefore, the capacity of the earth to produce food would not keep pace with the increase of population. This theory of population advanced by Malthus failed, because he did not make allowance for the great progress which has been made in inventions, nor for the improved methods of cultivation which civilization has introduced.

The real truth is that the capacity of the people of the earth to produce food is much greater in proportion to their numbers than during the time of Malthus. Take an example which is very near at home. The agricultural population of California does not exceed one hundred thousand people. There are not in excess of twenty thousand adults engaged in agricultural pursuits in California, and yet these twenty thousand men produce an annual export surplus equal to from one million to twelve and thirteen hundred thousand tons per annum. One million tons of wheat per annum will furnish breadstuff for ten millions of people. Here, then, in California twenty thousand people, by the assistance of labor-aiding machinery, are producing in a single year bread sufficient to feed ten millions of people a whole year. Right under our own observation, then, twenty thousand men produce in a single year bread enough to feed five hundred times their own number. In a state of barbarism, or even in the more primitive stages of civilization, this result would have been impossible.

In fact, in a state of barbarism, the individual with his bare hands and possibly a few rude implements of agriculture or hunting equipments, is barely able to support himself, and minister to his own physical wants. Conditions in a state of barbarism may appear to be more nearly equalized to the superficial observation, because all are on the dead level of abject poverty, below the line of which there is submergence or actual starvation.

LIMITATION OF MAN'S WANTS.

I have already said that the wants of men are limited only by their intellectual capacity to perceive them. Let me add to that a most obvious fact; with the capacity to perceive wants, the power to find the means of their gratification is also very greatly increased. In low conditions of civilization the wants are few and the productive capacity correspondingly

low. In a high civilization wants are multiplied, and become more complex, and the capacity of man to supply them is augmented even in a much greater ratio than the capacity to perceive them. In stages of civilized development where the wants are very few, and the habits of life very simple, the use of labor-aiding machinery is also very limited; but with the expansion of the mind under civilizing influence, the inventive genius rises, and while new wants have birth in mind, still greater capacities for producing the things required to gratify these wants are also engendered.

When you meet with a man who is poorly clad, poorly fed, living in a state of poverty, you are always beset with the painful reflection that the unused portions of the earth would offer a broad field for the application of that man's productive capacity which would yield him and his family an abundance. When you see a man without employment, and reflect that but a small area of the earth, from which all the wants of man are supplied, is under cultivation, and, therefore, but a very small proportion of the earth yielding its abundance to supply the wants of men, the contemplation is necessarily saddening. The fault is with the organization of our industrial systems. The individual so circumstanced belongs to the class of people who wait the action of an employer, instead of originating employments for themselves.

Now, the employer class originates employments only for the gratification of its own wants. The hirer of labor uses other men in the employed relation only to the extent that his own wants demand. Those, therefore, who, having productive capacity, remain in poverty, belong to the class who constitute the surplus over and above the numbers required to satisfy by the product of their labor the wants of the employer class. The numbers belonging to this surplus class would be constantly diminished, and would eventually disappear under the operation of the coöperative principle.

COÖPERATION WOULD IMPROVE CONDITIONS.

In the first place, coöperation would so improve the condition of the working men engaged in it, that their own wants would be multiplied, and a greater demand for labor would ensue; and, in the second place, too much importance cannot be attached to the fact that no man can do anything unless he has first received a preparatory education. This is just as indispensable in an employer of labor as it is in any other department of human activity. The number of employers of men will necessarily be limited to the number who have the capacity to accomplish profitable results through others. Coöperation would be a preparatory school qualifying men, not only to direct their own energies, but to direct the labor and skill of others.

Let us illustrate this plainly and simply. Suppose that to-day, for every one hundred men engaged in manual labor, there is but one employer who is originating employment for the other ninety-nine. This one individual, it may safely be presumed, is the only one among the one hundred who is qualified to successfully direct to a profitable issue the productive capacity, the skill, and the industry of the others. Now, suppose that twenty out of these one hundred form a coöperative association, and thereby become the employers of their own labor. Each begins by first directing his own. Having mastered this problem each is now prepared to take the next step, and to become the employer of others. Here, then, a coöperative association becomes a school in which employers are educated, and eventually, instead of one man in one hundred having the requisite capacity to direct the employment of others, you have twenty-one, because the coöperative association has qualified twenty new men for the high and beneficial office

of originating employments and directing successfully the productive energy of their fellow men. With the increase in the number of those qualified to profitably direct the employments of their fellows, there is to be a corresponding increase in the numbers demanded by the proprietor or the employer classes, and with the increase of the number of employers there is necessarily a corresponding intensity of competition between them in the field of originating employment. This competitive relation alone would raise the reward of labor.

HOW TO INCREASE THE DEMAND FOR WORKERS.

Increase the number of those who have sufficient capacity to originate employment, and derive a profit out of directing the energies and industries of their fellow men, and you necessarily increase the demand for employés. Thus coöperation will increase the number of those qualified to originate employments, and thus import into the industrial system a competition among the employer class, a condition highly favorable to the employed.

If I have been so fortunate as to make myself clearly understood, you will perceive that the underlying difference between an industrial system conforming to the principles of coöperation and one dependent upon perpetuating the relation between employer and employé, is one which addresses itself directly to the distribution of wealth. In the employed relation, the number of men an individual can employ is limited only to his skill and capacity as an employer, and to the amount of profitable and productive employment he is able to offer.

There are individuals, and associations of a small number of individuals, who are employing large numbers of men. I have no statistics at hand which would enable me to state with accuracy the highest number employed by a single individual, but I assume that there are those who employ in the enterprises projected and carried forward by themselves as high as twenty thousand men, women, and children. There is a single stationer in the city of London who employs in a single building, in printing, engraving, and lithographing, three thousand six hundred men, women, and children, and the same individual employs fully as many more in the manufacture of paper, envelopes, etc. Here is a joint effort having two distinct departments. On the part of the employer, the problem to be solved is the purchase of material, economic direction of labor, and the sale of manufactured goods. Subsidiary to these, it is the office of the employer to discern clearly the tastes and demands of the public, and not only to supply a demand already existing, but to promote or create additional demand. The manufacturer who has no regard for merchandise is liable to operate at a disadvantage. The merchandising side of the effort, therefore, becomes an incident of successful manufacture. Moreover, the problem of success requires skill in the purchase of material, which, as we have seen, is merely a form of labor not performed under his direction, and also the promotion of skill, industry, and diligence among his employés.

The profitable employment of so large a number of men, and the successful solution of all the problems involved, is a very high office, requiring a broad range of faculty, great breadth of view, vast executive capacity, systematic economy in the various departments, and tireless commercial activity. The financial success of such a man, in the natural order of things, will be greater than that of any single individual employed by him. A small profit arising upon the production of each of several thou-

sand persons in his employ, when aggregated, will make, in the course of a business career, a large accumulation in his hands, and proportionately to the number employed, the proprietor class will necessarily accumulate comparatively large fortunes as compared with the laboring class. Likewise, the merchant, who is a distributor of the product of labor, and stands between the producer and the consumer, devotes his thought, his time, and his energy to the accumulation of profits arising out of production due to the labor of others. The office of the merchant is a beneficent one. He performs the very necessary function in the commercial organization of distributing economically the product of labor.

DIVISIONS OF HUMAN LABOR.

The division of human labor into separate departments of activity has in all time been recognized as highly advantageous. The object of all production is the exchange of labor in these separate departments. The shoemaker devotes himself to the manufacture of shoes and boots, and thereby acquires great facility in the trade; but his own necessities are varied, and a great variety of trades and callings are brought into requisition to supply his wants. The wares he produces must be exchanged, and the merchant is the medium of this exchange. If the office he performs is conducted strictly in accordance with true, mercantile principles, it is an indispensable one to the profitable exchange of the varied products of the various departments of human activity.

All these various offices, to be successfully and advantageously filled, require special preparatory education and experience. Successful merchandising is as much the result of trained faculties, broad and enlightened intelligence, and skill as the making of a good watch. Underlying every occupation, and indispensable to success, there are certain fundamental principles which must be clearly comprehended and completely mastered, and the possession of the knowledge of these principles and of their application to business is in each instance a profession or calling, or, as we may say, a trained occupation. The producer of things useful to men lives in what we may term, for the purpose of illustration, the world of production. The employer class and the distributing class may be said to live in a realm of accumulation.

Coöperative efforts associates these two great departments, and combines them in one and the same body of men. Coöperation being a method by which an individual employs his own labor, and thereby accumulates the premium which, under the opposite system of industry, inures to the benefit of the employer, it becomes, at the same time, a more effective method of accumulation.

HOW COÖPERATION CAN BE EFFECTED.

The advantage of coöperation being established, the question naturally arises, how it can be effected. The bill I have introduced in the Senate of the United States is designed to be the practical instrument of coöperative organization. It will give legal definition and status to coöperative institutions. It is designed to define clearly the relative rights, duties, and obligations of individuals in a coöperative relation, and also the legal relations of such institutions to individuals, corporations, and other coöperative institutions.

At the very threshold of coöperative effort we find that the coöperative association must perform for itself the offices that have been performed by

the employer, by the purchaser of materials, by the director of labor, and by the merchant.

Coöperation is not itself designed to eliminate, and could not eliminate if it was so designed, these offices from human activity. What is designed is that labor shall perform these functions for itself; unless they are performed with the same executive qualifications necessary to success under the opposite system, they will result in failure. The first thing necessary, then, is a plain recognition, on the part of those intending to unite their labor into coöperative relation, of the necessity for an intelligent direction equal to that which directs labor in the employed relation, for equal executive ability in the purchase of materials, the distribution of labor, the direction of skill, and the sale of wares.

Success in all these departments of activity are as much dependent upon capacity and preparatory education as mechanical skill or professional acquirement. The first step, therefore, will be for those engaged in a calling, or craft, to associate a chosen number who, availing themselves of the provisions of the bill, enter into a legal organization wherein their duties and obligations are defined by law. The second step is to select from their number executive officers who, by reason of their experience and special fitness, are qualified to perform the higher offices of directing to an intelligent issue the coöperative effort.

This enforces a clear recognition of several things, chief among which is that productive labor, however intelligent or skillful in the realm of its special production, requires intelligent direction to reach successful results. Due regard must be had for the special department of labor in which the coöperation is undertaken. Thought must be bestowed upon the quality and character of the wares and merchandise produced. Judgment must be exercised in the apportionment of labor to those most skilled in its separate branches. Executive ability must be employed in the financial department of such an undertaking. Thus, executive ability, financiering skill, clerical accomplishment, and, in short, the exercise of all the varied qualifications which combined guarantee to the employed relation all the success it has ever achieved, and necessary to a coöperative institution.

I think I have observed a reluctance, on the part of men whose lives have been spent in productive labor, to recognize clearly and fully the difference of capacity among men. Coöperation will be a failure without such recognition. Coöperation is not designed to be the haven of incompetency, but to combine the full force of united strength working as a unit for a common benefit.

LABOR TO BE UNDER PROPER DIRECTION.

When a method of industrial organization is sought, the underlying principle of which is to give to labor the full reward of its toil, any attempt to merge the capacities of those coöperating, whereby a general average will be struck between competency and incompetency, diligence and sloth, intelligence and ignorance, will be at once in contravention of the great underlying principles of coöperation. Further than this, it is not the design to divorce labor from its intelligent direction, but rather to associate the intelligence as well as the productive skill and capacity of workmen into coöperative relation.

Under the provisions of the bill it will be possible for those proposing to form a coöperative society to so formulate their articles of association that the unworthy, should any such become members, can be divested of their membership. This can be accomplished by providing the means by

which an appraisalment of the value of an interest may be had, and if the association shall be so unfortunate as to find among their number one addicted to drunkenness, to immoral practices, to habits of indolence, or insubordination, or possessed of a violent and intractable temper, such member's interest in the association may, upon demand of two thirds of the membership, be appraised, and upon payment to him of the value of his interest the member himself can be expelled, thus rooting out all those whose habits or disposition would make their membership a continued menace to the success of the society. A coöperative association may also provide that each member shall receive wages or salary, and while being invested with membership will, during the time he is employed, act in the capacity of workingman, under the direction of the President or General Director. In this employed relation the officer over him should not be denied that degree of authority which will enable him to enforce all the discipline of industry, all the requirements of good workmanship, skill, and diligence which will be found to be indispensable to success.

ARTICLES OF ASSOCIATION.

All these contingencies may be provided for in the articles of association, which each member should be required to sign, and which would constitute a code of rules and regulations, forming the basis of the agreement between the members. In this sense a coöperative society would be the employer of its own members. It would pay wages, and if the aggregate product of the labor performed yielded a profit in excess of the wages paid, then out of such profit a dividend to the members should be declared, and the dividend should be paid to the membership in proportion to the labor performed by each. If, in the prosecution of any enterprise, the association should find it profitable to employ persons who are not members of the association, such employment would not be inconsistent with the objects of the association. Such association should in all respects remain voluntary, and a coöperative society should be at liberty to admit additional membership, if profitable employment can be found for an additional number of members, or to employ in emergencies the time of workingmen, the same as labor is employed by individuals or corporations.

All that organization implies is the existence of a unified body, having organs with separate functions.

Coöperative organization must necessarily conform to this law of being. In the prosecution of any enterprise there are natural departments of activity. These varied departments call for capacity in the performance of their functions. It will become speedily apparent that a single head—to be called, perhaps, a manager or director—must be chosen, and this head must be invested with that degree of power necessary to the accomplishment of definite and successful results. The highest test of fitness to enter into the coöperative relation will be the intelligent perception of the necessity of obedience. Every undertaking is amenable to certain inexorable laws, which may be termed the law of its success. Coöperative organizations must be brought under subjection to these laws. To this end capacity in each natural subdivision or department of activity must not be denied that degree of authority necessary to make its functions effective for the good of the whole. Otherwise the reward of industry will be defeated by the incompetency of its management and direction, by waste in the purchases and sales, by ignorance of the relation of demand and supply, and by all other vicissitudes and attributes, which confer upon the

commercial and manufacturing activity surrounding us the changing kaleidoscope of success and failure. There is no royal road to great achievements in any department of human thought or human activity. Coöperation will not, therefore, abolish the law of commercial success and failure. However great the advantages to labor of the coöperative principles, coöperation itself will be amenable to the great law that the success of all efforts is ultimately dependent upon its intelligent direction.

Intelligent concurrence in the proper direction of effort is equal in dignity to the intelligence which directs. By far too little importance has been attached to this great truth. However high the intelligence which directs, its measure of success is forever dependent upon the concurrence of the association. Coöperative organization will, therefore, find itself amenable to those laws of intelligent direction and intelligent concurrence. They will find it necessary to define the functions of office, and to commit the discharge of these functions to those best qualified to perform them.

THE NEW SPHERE OF ACTIVITY.

Thus organized, coöperative association is equipped with the full round of competency. In such relation the members enter a new and higher realm of activity. It is by their concurrence that they are directed, and thus concurrence becomes itself the directing force. There are large numbers of men whose services may be secured, already well qualified to fill the necessary offices of such an organization, and thus entering upon an employed relation founded in concurrence, each associate becomes in a sense the director of his own labor, and each member begins at the very outset to acquire competency in a higher and broader realm. Each coöperative institution will, therefore, become a school of business, in which each member will acquire a knowledge of the laws of trade and commerce pertaining to his business, and thus to their mechanical skill each will be adding a stock of that knowledge so necessary to success in the realm of accumulation.

The value of all this to the character of citizenship should be apparent, without illustration. To comprehend it in all its breadth, however, let us assume that in all time all labor had been thus self-directing. If instead of the proposition before us to change the industrial system from the employed relation, and place it under self-direction, the coöperative form of industrial organization had existed from all time, and we were now for the first time proposing to reorganize the employment of labor, and place it under non-concurrent direction, I apprehend the proposer of such a change would be regarded in the light of an enslaver of his race. He would be amenable to the charge that his effort was in the direction of reducing the laboring men to an automaton, and that vague apprehension with which all untried experiments are beset would leave but small distinction in the minds of workingmen between the submission of all labor to the uncontrolled direction of an employer and actual slavery. We may safely assume that such a change would be impossible—that men are not likely to voluntarily surrender the independence of character which coöperation would establish for any lower degree of servitude.

DIGNITY OF LABOR.

I would not by this illustration be understood as claiming that any useful employment is lacking in dignity. All labor is honorable, all industry noble, and, under the operation of our free institutions and our free educa-

tional systems, the masses of workmen have become constantly more intelligent and more worthy. In fact coöperation is merely an extension to the industrial life of our people; of our great political system of self government. That government itself is founded upon the great doctrine of the consent of the governed, and has its cornerstone in the memorable principle that men are endowed with inalienable rights. This great principle has a clearly defined place in coöperative organization. The right of each individual in any relation to secure to himself the full benefits of his intelligence, his capacity, his industry, and skill are among the inalienable inheritances of humanity.

To resume, however, the practical phases of this question, I can see no reason why coöperation may not be extended into various branches. As a people we are engaged in a varied agriculture, as well as in a variety of manufactures, and a varied commerce. A coöperative association designed to furnish labor for farming operations is clearly within the realm of practical achievement. A varied agriculture demands labor at different seasons of the year. An association of industrious, intelligent, and sober agricultural laborers, comprising men qualified to perform intelligently the varied requirements of agriculture and horticulture, would be of inestimable benefit in our labor system. They could organize for the purpose of furnishing labor as the vicissitudes of the season may require. There are various seasons for the various products; therefore coöperation would insure to the farm laborer annual employment arising out of the variety of the production of a neighborhood.

There is the season of plowing, of planting, of pruning, of harvesting, of the vintage, and these seasons are not coincident. An organized body of laborers, responsible as an organization for the faithful performance of the duties of its members, would find a large premium inuring to them, growing out of the facilities thus afforded to employ from a single labor exchange a sufficient number of workmen for the accomplishment of these varied operations in their appropriate seasons. Finally, it will be found that in coöperation, as in every other department of human activity, success will depend upon the adjustment of men to their various duties, according to their highest fitness. Let the man best fitted to direct, be chosen for that office. Then let intelligent concurrence supplement his effort, and honesty and intelligence will accomplish all the rest.

THE COÖPERATIVE BILL.

The bill under consideration was introduced in the hope that it would prove an instrument for the accomplishment of these great results:

In the Senate of the United States, December 20, 1886, Mr. Stanford introduced the following bill, which was read twice and ordered to lie on the table: A bill to encourage coöperation and to provide for the formation of associations in the District of Columbia, for the purpose of conducting any lawful business and dividing the profits among the members thereof.

WHEREAS, The right of association for any lawful purpose is a natural right; and whereas, the exercise of this right enables persons of small means, or whose only capital is labor, to combine such means or labor in a common enterprise, and bring to it the strength of the whole, and the intelligence of all; and whereas, the passage of liberal laws relating to the mode and manner by which coöperative associations may be formed, and defining the rights and duties of the members thereof, will encourage the formation of such associations, and give the incentive to industry which comes from a knowledge that its fruits will be secured to the worker; therefore,

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That any two or more persons may associate themselves together in the manner prescribed by this Act for the purpose of conducting any lawful business, trade, or occupation, or for any purpose for which individuals may lawfully associate themselves.

SEC. 2. That any two or more persons desiring to associate themselves together for the purpose aforesaid shall prepare articles of association, which articles shall set forth—

First—The name of the association.

Second—The purpose for which it is formed.

Third—The place where its principal business is to be transacted.

Fourth—The term for which it is to exist, not exceeding ninety-nine years.

Fifth—The number of the managers thereof, and the names and residences of those who are appointed for the first year.

Sixth—The amount of moneyed capital, if any, and the number of shares into which that capital is divided.

Seventh—If there is no moneyed capital, then the amount and kind of property which the association devote to the enterprise, and the interest of each therein.

Eighth—If there is neither a moneyed capital nor other property devoted, but the labor alone of the associates is in the first instance combined, then the amount of labor to be performed by each, the terms upon which it will be performed, and what percentage of the net proceeds of such labor shall be reserved to the association as capital for future operations.

Ninth—If moneyed capital and other property is combined, then the amount thereof and the kind of property, and the share or interest of each therein.

Tenth—If labor is combined with either moneyed capital or other property, or both, then the share or interest of each therein, the amount of labor to be performed by each, the terms upon which it will be performed, and what percentage of the net proceeds of such labor shall be reserved to the association as capital for future operations.

SEC. 3. That the articles of association hereinbefore provided for must be subscribed by the original associates and acknowledged by each before any officer of, or in any State or Territory of the United States having a seal, and authorized by the laws of such State or Territory to take and certify acknowledgments of conveyances of real property.

SEC. 4. That the articles of association so subscribed and acknowledged must be filed for record, and recorded in the office of the Recorder of Deeds for the District of Columbia, which officer must, upon the filing, make and deliver to the associates, or their agents, a certified copy thereof, noting on the same day and hour of its issuance: from which time the association shall be complete, and it shall have and exercise all the power for which it was formed.

SEC. 5. That a copy of any articles of association filed in pursuance of this Act and certified by said Recorder of Deeds, shall be received in all Courts and other places as prima facie evidence of the facts therein stated.

SEC. 6. That every association formed under this Act must, within ninety days after filing the articles of association, adopt a code of by-laws for the government of the association, not inconsistent with the Constitution and laws of the United States. The assent of members representing a majority of the capital stock or property subscribed, if there be a capital stock or property subscribed, or a majority of the associates, if there be no capital stock or property subscribed, shall be necessary to adopt by-laws.

SEC. 7. That any such association may, by its code of by-laws, provide for—

First—The time, place, and manner of calling and conducting its meetings.

Second—The number of members of the association which shall constitute a quorum.

Third—Voting by proxy, if it is so desired, and the mode and manner thereof.

Fourth—The number of managers, the time of their election, their term of office, the mode and manner of their removal, and the power and authority thereof.

Fifth—The compensation, if any, of the managers.

Sixth—The number of officers, if any other than the managers, and their tenure of office.

Seventh—The mode and manner of the transfer of shares, and the succession in membership.

Eighth—The restriction, if any, upon the transfer of shares, membership, and rights in the association, and the limitations as to the amount of interest to be held by any one or more of the associates.

Ninth—The mode and manner of conducting business.

Tenth—The mode and manner of conducting elections.

Eleventh—For assessments upon the moneyed capital subscribed, if any, or for the installments to be paid at stated periods, or for work to be done; the mode and manner of enforcing the payment of such assessments or installments, or doing work, or for forfeiting or selling the shares or interest of any member of the association delinquent for such assessments, or installments, or work.

Twelfth—Such other things as may be proper to carry out the purpose for which the association was formed.

SEC. 8. That the by-laws adopted must be signed by a majority of the associates and recorded in a book to be kept in the office of the association, and a copy of such record, duly authenticated by the seal of the association, if any, and signed by the keeper of such record, must be filed in the office of the Recorder of Deeds of said district. The by-laws may be repealed or new by-laws may be adopted at any meeting of the associates, by a vote of members representing two thirds of the capital stock, if any, or two thirds of the property devoted to the enterprise, if any, or if labor alone is devoted to the enterprise, then by two thirds of the persons composing such association; and the amendments, revisions, and new by-laws shall be recorded and filed in the manner provided for recording and filing the original.

SEC. 9. That every association formed under this Act shall have power—

First—Of succession by its associate name for the period of ninety-nine years.

Second—To in such name sue and be sued in any Court.

Third—To make and use a common seal and alter the same at pleasure.

Fourth—To purchase, hold, and convey real and personal property, as the purposes of the association may require.

Fifth—To appoint such subordinate officers or agents as the business may require, and to allow them suitable compensation.

Sixth—To admit associates, and to sell or forfeit their interest in the association for the purpose of paying assessments on or in default of installments or of work or labor required.

Seventh—To enter into any obligations or contracts essential to the transaction of its affairs, or for the purpose for which it was formed; but such association shall not have power to issue bills, notes, or other evidences of debt, upon loans or otherwise, for circulation as money.

Eighth—To do all other things proper to be done for the purpose of carrying into effect the objects for which the association is formed.

SEC. 10. That two or more associations formed and existing under the provisions of this Act may be consolidated one with the other, upon such terms as may be agreed upon in writing by members representing two thirds of the capital stock, if any, of each association, or two thirds of the property, if any, of each association, or if neither capital stock nor property, then two thirds of the members of each association, in which case articles of consolidation shall be prepared and filed in the same manner and form as the original articles of association, and with like effect; and from and after the filing of such articles, the association comprising the component parts of the consolidated association shall cease to exist, and the consolidated association shall succeed to all the rights, duties, and powers of the component associations, and be possessed of all the rights, duties, and powers prescribed in the articles of the consolidated association, and shall be subject to all the liabilities and obligations of the association's component parts thereof.

SEC. 11. That all associations formed and existing under this Act are required to keep a record of all their business transactions, which records shall be subject to inspection by any of the members thereof, and a copy thereof shall be prima facie evidence of the facts therein stated in all Courts and other places when offered in evidence.

SEC. 12. That in addition to such records, full books of account must be kept, showing the names of the members of the association, the amount of the capital stock, if any, the property, if any, belonging to the association, and all other things proper to show the condition in every respect of the affairs of the association.

SEC. 13. That no member of the association shall be individually or personally liable for any of its debts or liabilities, except in case he has subscribed to the association moneyed capital, and in that event he shall be liable on such debts and liabilities for the amount of the unpaid portions, if any, of such subscriptions; and all the property of the association, and all unpaid subscriptions, if any, shall, in case of the failure of such association to meet any of its obligations, be liable—

First—To the payment of all debts due to persons not members of the association.

Second—After the payment of all debts not due to the members of the association, then for any balance to the members of such association. And the property of such association may be taken in satisfaction of any judgment obtained against it in the same manner as the property of an individual. The interest of any member in such association may be levied upon and taken in satisfaction of any judgment against him in the same manner as the share of a partner in a partnership may be taken, and the purchaser at any sale made under such levy shall succeed to the interest of the associate against whom the process ran, subject, however, to such limitations as may by the by-laws of said association have been provided for in relation to succession.

SEC. 14. That the right of any association claiming to be organized under this Act to do business may be inquired into by quo warranto at the suit of the Attorney-General of the United States; but the right of an association claiming in good faith to be organized under this Act, and doing business as such association, shall not be inquired into in any collateral proceeding, nor shall its right and authority to do business as such be questioned, except by the aforesaid proceedings, in the nature of quo warranto, at the suit of the Attorney-General of the United States.

SEC. 15. This Act having been passed to promote the association of individuals, and to induce them to combine their capital or labor for their mutual welfare and the public good, therefore the rule of common law that statutes in derogation thereof shall be strictly construed shall have no application to this Act, but its provisions must at all times be liberally construed, with a view to effect its object and to promote its purposes.

SEC. 16. That this Act shall be in force and effect from and after its passage.

PART VII.

PUBLIC INVESTIGATIONS BY THE BUREAU.

CHAPTER I.

LABOR ON PACIFIC COAST VESSELS.

Since the last report of this bureau was issued public investigations were held as follows:

1. Into condition of men working in coast vessels.
2. Into condition of men working on the city front, San Francisco.
3. Into condition of men working for "sweaters," or middlemen.
4. Into condition of men on a strike at San Pedro.
5. Into condition of male and female printers.

Acting in the capacity of a Board of Conciliation much good has been accomplished in the way of strengthening union organizations, and harmonizing differences between employers and their employés.

Prior to the first investigation, labor on the city front lacked unity of interests and concentration of force for the common good. Now they are nearly all united in a federated body, and the utmost harmony and good feeling prevail. This body is known as the "Wharf and Wave Federation," and numbers at present six thousand five hundred and seventy members, with a likelihood of an immediate addition of twelve hundred more.

The report of the investigation into the condition of women working for "sweaters," or middlemen, is given in Chapter IV of Part II of this report.

The result of the investigation into the strike at San Pedro is given in Chapter III, Part III of this report.

The investigation into the condition of male and female printers in certain printing houses in San Francisco has been followed by most encouraging results. Cordial relations now exist between the "Pacific Press," of Oakland, and the Typographical Union, and several firms in San Francisco have acceded to the reasonable demands of the Typographical Union with regard to the scale of prices and the number of apprentices. The union itself has been greatly strengthened by the accession of many new members, and the general condition of the craft has been much improved. Messrs. Bacon & Company, however, still refuse to come to terms with the union, notwithstanding the good example of the "Pacific Press," and other firms.

As the testimony given in the course of these investigations is voluminous, covering nearly two hundred pages, I deemed it proper not to encumber this report with it, especially so as it has already been published in pamphlet form.

The causes which led to the investigation, a brief summary of the proceedings, and the conclusions at which I arrived, after all the testimony had been taken, were published at the time, and are herewith submitted:

INVESTIGATION BY THE COMMISSIONER OF THE BUREAU OF LABOR STATISTICS
INTO THE CONDITION OF MEN WORKING ON THE WATERFRONT AND ON
BOARD OF PACIFIC COAST VESSELS.

Communications were received June 15 and 16, 1887, by the Labor Commissioner, from the Representative Council of the Federated Trades and labor organizations of the Pacific Coast, and from the Knights of Labor of San Francisco, requesting him to investigate the condition of labor on the waterfront and on board of coast vessels.

On June twenty-second the following communication was also received from the Coast Seamen's Union of the Pacific Coast:

COAST SEAMEN'S UNION OF THE PACIFIC COAST, }
SAN FRANCISCO, June 21, 1887. }

JOHN J. TOBIN, Esq., *Commissioner State Bureau of Labor Statistics, San Francisco:*

DEAR SIR: The members of the Coast Seamen's Union of the Pacific Coast hereby join in the request that you commence an investigation of the status of the men on the waterfront and on board of the vessels touching the ports of the Pacific Coast. We feel convinced that it would be impossible to gain a correct insight into the peculiar circumstances existing among men working on board of the vessels, or on the piers, and in the docks, unless a great mass of testimony be adduced and collected from all sides. While we, therefore, are anxious to assist other organizations in this investigation, we would beg leave to suggest some reasons why the Coast Seamen's Union itself would lay claim to your attention.

The union has a membership of upwards of three thousand men who are constantly working on this coast, and who, under the laws of this country, are the direct wards of the Government, and, therefore, entitled to an attention, which has hitherto been very sparingly, indeed, given to them. The union has done its utmost to organize all sailors for the purpose, only, of making them thinking men. Agencies are established, and are in good working order, in Port Townsend, Eureka, San Pedro, and recently in San Diego. The system of official correspondence between the agencies and the head office in San Francisco, together with the system of finances and of mutual assistance in case of shipwreck, etc., have been perfected, and order created out of preëxisting chaos by the men themselves, and often in spite of a violent and bitter opposition from outsiders. These efforts achieved single-handed, should plead the cause of the men with any one who can give them an opportunity to state publicly, and through undeniable evidence, their grievances, their successes, and their defeats, so as to enlist public opinion in their warfare against oppression and the opponents of the progress of the union and the happiness of its members.

We respectfully request that an investigation into the affairs of the coast sailors be made in the following three directions, viz.:

1. The manner of shipping men.
2. The treatment of the men on board, and their accommodations in the vessel.
3. The manner in which the men are paid off.

We believe that these three points will cover all. We feel sure that evidence of the most startling character can be brought to show how the sailor has been kept purposely in his present acknowledged degraded condition, to render him a will-less commodity in the hands of unscrupulous speculators, with which they could "bear" and "bull" the market. We shall adduce evidence to show how large corporations are systematically robbing their sailors, by paying them short wages, the shortings being too small for each separate man to make it profitable for him, under existing circumstances, to go to law about it, but when accumulated forming a large item in the yearly income of these corporations or their officials. We shall show how the "Sailors Home," an institution formed for a benevolent purpose, has been transformed into a common boarding-house, in which the practice of paying the sailor short wages is as generally adopted as it is among other institutions of that kind. We shall follow the sailor, step for step, and show how his propensity for strong drink is fostered by those who have the liquor trade in hand on the waterfront, and how his only hope of getting a new berth depends upon the speed with which he hands to the boarding-house master the wages earned on a former voyage. We shall show how, when he occasionally wakes up to a consciousness of the robbery and outrages perpetrated on him, and tries to regain by law what has been taken away from him by force, he is met by unexplainable delays and technicalities, which render it absolutely impossible for him to get redress for his wrongs, and this at the hands of a Government which the people appointed his special guardian.

Go to the waterfront and see for yourself what the condition is of a large class of citizens, on whose strength and sagacity depends one of the principal means of developing the wealth and resources of our country. Give them an opportunity of showing the forlorn hopes and outcast, abject condition of men, who are made to accumulate riches for others, while the enjoyment of common decencies of life are forever denied to themselves.

No investigation has, so far as we know, ever been made in this direction. Well may it

be, that the immensity of the task has frightened others from any such purpose. We hope that it may have no such influence on you, but that you will grant us our request, without limiting us as to time. The evidence is not always ready at hand. Many a man, whose testimony we would like to have brought before you, only comes into port at regular intervals of time. Much time will sometimes have to be consumed in order to bring out one valuable point.

We hope that this will not deter you from an undertaking calculated to benefit so large a class of America's workers.

Your obedient servants (for the C. S. U.),

V. HOFFMEYER, Chairman Advisory Committee.

ANDERS FURUSETH, Secretary Coast Seamen's Union.

Differences between employers and employes, troubles between rival labor organizations, or disturbed conditions between capital and labor, should properly be referred to a Board of Arbitration or Conciliation, for adjustment.

Having no such tribunal in this State, and the Labor Commissioner being recognized, by the industrial classes at least, as the only available arbiter in matters affecting the interest of labor, I considered it right and proper to follow precedent, and accede to the request of these organizations.

Although the powers of the Commissioner are limited by law to examining witnesses under oath, and sending for persons and papers, the facts brought to light during the investigation are likely to germinate wholesome remedies. The investigation opened June twenty-ninth, at the office of the bureau, 220 Sutter Street, and the Commissioner was ably assisted by the Special Agent of the United States Bureau of Labor Statistics, Mr. Lee Meriwether. The investigation was thorough and extensive, as the large mass of testimony herewith submitted demonstrates. All parties interested—ship owners, masters of vessels, shipping officers, slop or outfit dealers, boarding-house keepers, officers of coast unions, and seafaring men, generally, were examined under oath. Affidavits from seafaring men, from other ports along the coast, were also submitted. The Coast Seamen's Union was represented by the Chairman of its Advisory Committee, Mr. V. Hoffmeyer, and Mr. W. W. Foote acted as counsel for the Ship Owner's Association, when testimony relating to the latter was taken.

The evidence clearly demonstrates the fact, already widely known, that the sailor, ashore, is looked upon as the legitimate prey of land sharks. From the day he arrives in port, until the day of his departure, he is never out of the hands of sharpers, who coax, wheedle, debauch, and pander to his worst vices, until his last dollar is gone. Not even then is he a free agent. As the price of release from their clutches, he must submit to have his future earnings mortgaged. He must labor hard for many a day to repay the blood money and the "advances" given on his account by these Shylocks.

From the testimony of sailors during the investigation (corroborated by personal inquiry) the manner of inveigling and preying upon the sailor may be thus described:

A day or two after a ship's arrival, a boarding-house runner goes aboard, professes great friendship and sympathy for the sailor, makes glowing promises about work and wages ashore, and finally induces him to leave his ship. The sailor goes ashore, and by so doing generally forfeits the wages due him.

Captains of vessels with the prospect of a long stay in port often take a hand in this, by abusive treatment of their men, in order that they may desert the ship, and thus make a clear gain to the owners of the sailors' accrued wages. This method of doing business is known among seafaring men as "working off." The boarding-house keeper into whose clutches the

sailor falls, keeps him, and supplies him with liquor and other unaccustomed luxuries, until his money is gone and a large bill is charged against him.

Then, and not till then, the boarding-house keeper procures him a berth on board a ship, taking care, however, that the Captain will secure for him the payment of all charges against the badly fleeced victim.

From the testimony it will be seen that sailors are charged extortionate rates for bringing them off the vessels and taking them on, for discounting their due bills, for commissions on account of getting them berths, and for other services. It has also been put in evidence that when sailors remain only a part of a week in a boarding house they are charged for a full week.

A cordial understanding seems to exist between the boarding-house keeper and a certain class of sailors' supply dealers. Masters of vessels are not ignorant of the coöperative schemes of which the sailor is the victim, and some even share in the spoils.

The sworn testimony of all proves that it is next to impossible for a sailor to get a berth, or what they term "a chance," without the aid and intervention of a boarding-house keeper or "master."

The latter goes to the Captain of a coast vessel, and, by paying a stipulated sum, induces him to agree to ship all his men through the said boarding master's agency.

Notwithstanding that all the boarding-house keepers who were examined denied that they paid this money, facts have come to the knowledge of the Commissioner, upon personal inquiry, which leaves no room to doubt of its being done.

When Mr. Swannack, Superintendent of the Sailors Home, was confronted with the items in his reports for the years 1885 and 1886, of \$655 05 and \$1,366 87, "paid for employment of sailors," he explained by saying said amounts were paid to Captains of vessels, as commissions for collecting bills due the Home.

The Clerk of the Home, John Fjerem, however, in his testimony candidly admitted that Captains were paid for the privilege of shipping men. He said: "When men are plentiful we generally have to give some kind of inducement to take them. It has gone under the name of collecting our bills, but it actually is for shipping." When questioned about the foregoing items, he answered, "I have kept all that; * * * when there was a ship we were glad to offer the Captain as much as four and five dollars a head to take men." On deep sea vessels the reverse of this is the case. The Captains pay instead of being paid for sailors. The money thus paid to boarding-house keepers is what is termed "blood money."

Superintendent Swannack testified that instead of raising sailors' wages when men became scarce, the blood money is increased. "The boarding masters," he said, "got \$20 blood money last December, and they demanded \$30, and they got \$30. They wanted \$40, but the Captains would rather raise the wages to \$30 a month than pay the \$40. When the boarding master gets \$30 blood money, he gives the runner half of it, and pays him \$5 besides for each man that he catches. When there are plenty of men to fill the ships, *instead of raising the wages*, the boarding masters give half the money back to the British Captains. It is they who demand this return—the American Captains seldom get anything."

The present system of paying an advance on sailors' wages is pregnant with evil. It tends to make the sailor improvident, by opening an avenue through which he can pay bills he would not otherwise contract. It makes him dependent upon the person to whom he owes a debt, and thus he

becomes a commercial slave rather than a free man, because his freedom of contract is destroyed.

The best and speediest way to remedy the evils complained of, and reform the corrupt and debasing methods now practiced, is by organization among the sailors. Banded together for protection, seafaring men will make their grievances known and felt, and remedies will be sure to follow. Since this investigation began an association has been formed for the express purpose of doing away with blood money. One of its leading promoters, Mr. F. B. Walton, testified that the Captains of the "G. F. Chapman" and the "Argus" refused to pay \$40 blood money to exacting boarding-house masters. He said to them: "All right, gentlemen, I will go out and start another association, and let these men (the boarding masters) come up and talk as they like. It is a very hard thing to fight against these men. There are twenty-seven of them." Those two ships were supplied with sailors, and the association expects to supply others as they come.

The seamen on the great lakes between the United States and British America have formed an association called the "Lake Seamen's Union," which numbers over seven thousand men. The President of this union, Mr. Richard Powers, in the testimony given before the Senate Committee on Education and Labor, in 1883 (page 422), said about the advantages gained, that—

Sailors are not so liable to be handled and used now as they were formerly—they are no longer to be run by the rum-shop influence. Another point is, they gain a little better wages in one respect, at least. On these inland seas they used to work not eight hours, not ten hours, but in many cases twenty-four hours a day. We had to rebel in our own way, and organize for our own protection. The organization has been a benefit to thousands. It has captured a class of people who were very degraded, lifted them up in society, and made them a credit to the land.

When men come off a vessel they have a reading-room to go to, and they now read and study questions and know what is going on. We made a demand for a certain amount of wages, and it was very liberally granted.

Q. What were the wages that the men received before the union was formed? A. \$1 per day. They get \$2 now at this season of the year.

Q. By what means did the union raise the price of labor? A. We just resolved in our meetings that we would sail for so much, and no less, and resolved that we would not sail with any one that did not belong to the union—allowing mates, and cooks, and Captains not to belong to it, of course. Nobody on board is supposed to belong to the union but the sailors on the vessel and one apprentice. We demanded the apprentice rule ourselves, for the purpose of bringing up sailors. We don't take boys from farms and make sailors of them at once; we want apprentices.

The Federated Seamen's Union of Australasia is also a powerful and well conducted organization, which has done and is doing good service in protecting the rights of seamen and ameliorating their condition.

The Coast Seamen's Union of the Pacific Coast, with headquarters in San Francisco, was organized March 6, 1885, and in about a month had a membership of one thousand seven hundred. A shipping office was then opened by the union, which proved a failure because, as the members allege, the ship owners, who promised their patronage, failed to do so.

In a year the membership increased to over three thousand, which embraced nearly all the sailors on the coast. The union then had apparently a bright future before it. In June, 1886, what is known as the Spreckels strike took place, which developed in the August following into a general strike of the Coast Seamen's Union. This strike was ill advised. The season was not opportune. The organization of the seamen had not had time to be sufficiently matured and prepared for such a contest. Some of the leaders and abettors were not men identified with the sailor interest. The result, failure, was inevitable under such circumstances. The ship

owners of the coast formed an association and opened a shipping office, through which men had to be shipped before they would be employed on coast vessels. The Coast Seamen's Union looked upon this shipping office as inimical to seamen's interests. It tried to obtain control of the shipping of men, and, failing in this, to have half control. Frustrated in both propositions bitter feelings of hostility were thereby engendered.

In the course of this investigation much has been said of a personal and reeriminatory character between these two organizations in reference to events which occurred during the strike. As I consider such beyond the scope and purpose of the investigation, which had to do with the present and not the past conditions of seamen, I shall not express any opinion about them. The testimony speaks for itself. Suffice it to say, a fact which history teaches, so long as men allow others to do business for them which they can do for themselves, so long will they suffer. What is being done successfully in other places can surely be done in San Francisco.

The steamship sailors of this coast conduct their own shipping with most excellent results. Why not the sailing-vessel sailors do the same, and thus free themselves from the accursed boarding-house system?

An institution known as the "Sailors Home," under the control of the "Ladies Seamen's Friend Society," has been established at the old United States Marine Hospital, which has been donated for the purpose by the Government. Although clean, well kept, and conducted on temperance principles, it is not a charitable or benevolent institution, as its name would seem to imply. It is simply a boarding house, with charges similar to other boarding houses. The spiritual but not the physical infirmities of the inmates are attended to upon the premises.

The reforms asked for by the Coast Seamen's Union are summed up by Mr. V. Hoffmeyer in a very able argument which he presented on the facts elicited during this investigation. They are here submitted, and in them I most heartily concur:

The reforms which we ask you to assist us in carrying through consist for the coast sailor in those suggestions which I have permitted myself to make above. The union recognizes that reform in the shape of legislation must mainly refer to the deep-water sailor. It is the advance system which is at the bottom of all the trouble. By means of this system it becomes possible for the boarding-house master to fasten himself like a leech to the sailor. Were the advance system to be abolished the boarding houses would disappear in the course of a few years, simply because there would be no profit in them. That business would have to be changed to a cash business, or in other words they would have to confine themselves to legitimate operations. The blood-money system (by blood money is understood any money paid *by* the Captain to secure the services of a sailor, or to the Captain to secure a berth in the ship) is of far smaller consequence.

There have been many laws passed for the sailor since 1872. Indeed there are so many laws and amendments that considerable confusion exists as to what statute or law shall govern particular cases.

In 1872 the Shipping Commissioner's Act was passed, containing a complete system for the shipping and paying off of all sailors. This Act was amended in 1874 to apply only to deep-water sailors. In the same year the Shipping Commissioner's Act was entered upon the revised statutes. In 1884 another amendment was passed—commonly known as the Dingley Act—the principal features of which were that the seamen could be discharged in any port without the three months' extra pay for foreign ports, as the Shipping Commissioner's Act provided; that a slop-chest should be kept by the Captain on board from which the sailor could provide himself with articles of clothing and tobacco at a small advance over the wholesale prices; that no more hospital money could be deducted from the sailor's wages, and that no advance money should be paid to him when he shipped. The Dingley Act was later amended by allowing a certain amount of advance money in accordance with a given schedule. There is a question whether the amendment of 1874 applies to the amendments passed after that year, and consequently whether the coast sailor in any way can come under the Shipping Commissioner's Act, or its amendments. It is now generally held that he comes under the general admiralty laws. These laws make the sailor a ward of the Government, and refer him to the United States District Court if he desired to sue for wages, etc. There he must first have his complaint drawn up by a lawyer, and then presented to the District Court, or where no such exists, to the State Court or Justice of the Peace, who then shall commence a civil

suit against the Captain or the owners. These proceedings render it useless for the sailor to sue. First, because the necessary lawyer fees generally amount to more than the sum he desires to recover from the ship. Secondly, the Captain prepares a bill of exceptions, files bonds, and leaves with his ship, while the sailor must stay so as to be ready when the ship comes back, and this he usually cannot do, as he possesses no means by which to live during this time.

It will be seen that the benefit which the amendment of 1884 was intended to give the sailor, has been entirely neutralized by the later amendment, and the only effect of that Act, beyond the abolition of the hospital money, is that the sailor now can be discharged in foreign ports without the former three months' extra pay. The importance of the slop-chest has been reduced to nothing, as the advance money given makes it an object for the boarding-house master to sell, or rather, to force the sailor to buy, all necessary and unnecessary things from him before the ship starts. To effectually protect the sailor from the persecutions of the boarding-house master, the latter should be prohibited from being present in the Shipping Commissioner's office when the men are engaged. When it is announced that a ship will engage men for a certain voyage, on such and such a date, it should be made possible for the sailor to go to the office on that day and make his bargain with the Captain personally. We understand that this is so stipulated in the English shipping laws, and that it has worked great benefit to the sailors of that nation.

The seamen demand the passage of an Act by our National Legislature which shall cover the following points:

A law to prevent the giving of any advance money.

A law to make it possible for the sailor to ship himself without the intervention of any boarding-house master, or other person, by forbidding any one to appear with him before the Shipping Commissioner when he is engaged by the Captain and signs the articles.

A law which prevents a boarding-house master, or other person who has derived any profit from the sale of general merchandise to the sailors, from being appointed to the position of Shipping Commissioner.

A law which makes it possible for the sailor to draw the full amount of wages due him in any port of discharge.

A law providing that all cases for the recovery of seamen's wages in the United States Courts must be given preference over all other cases, whether on trial or not, and be tried and disposed of within forty-eight hours subsequent to the filing of the libel, provided the seaman shows reasonable diligence in prosecuting the same.

Very respectfully,

JOHN J. TOBIN,

Commissioner of the Bureau of Labor Statistics.

CHAPTER II.

INVESTIGATION OF LABOR MATTERS ON THE CITY FRONT, SAN FRANCISCO.

In compliance with the request of the Council of Federated Trades an investigation into the condition of labor on the city front of San Francisco was begun by this bureau on July 6, 1887. The matters particularly inquired into were those affecting sailors and longshoremen and stevedores. Many facts of interest and importance were brought to light and published in the daily press during the course of the investigation. Reprehensible methods of treating men, and unwarrantable, tricky, and unfair ways of treating fellow-craftsmen were shown up to the public gaze. There is no doubt that the exposure and publicity given these things will have an ameliorative effect, and reforms will undoubtedly follow.

There are twelve or more labor organizations along the waterfront:

Steamshipmen's Protective Association; Steamship Sailors Association; Pacific Coast Marine Firemen; Coast Seamen's Union; Steamship Stevedores Union; Stevedores Protective Association; Longshore Lumbermen's Union; Ship Joiners (mechanics) Union; Riggers Union; Riggers and Stevedores; Riggers and Shipwrights; Calkers Association; Coal Cart Association.

The Lumbermen's Protective Union is also a benevolent organization, with a membership of about fifty at present. This does not include all the

lumber stevedores along the waterfront, as three hundred or more belong to the Longshore Lumbermen's Association, closely allied to the Protective Union: in fact, one helps the other along, and a great many members of the former union belong to the latter. The wages are \$4 per day, for nine hours' work, with 75 cents an hour for overtime. The Longshore Lumbermen's Association has a membership of three hundred and fifty; work for 45 cents per hour, or \$4 per day of nine hours work, with the same overtime as the Protective Union. This union is gradually breaking up, as its members, not caring to support both organizations, are dropping out and joining the Longshoremen exclusively. Mr. A. C. Freese, a contractor, and President of the Protective Union, says a good man can average \$75 a month, but those that average this amount are very few. The only difference in the two unions is that the Protective Union buries its dead, and gives a member \$9 a week in case of sickness. The Longshoremen give the widow \$100, which applies to the burial, and does not allow anything in case of sickness. Out of the three hundred and fifty members, not twenty can average \$75 a month the year around. The balance can average from \$40 to \$50. The initiation fee into the Protective Union is \$5, with \$1 monthly dues. The Longshoremen pay \$20 initiation and \$1 a month dues. Most of the lumber dealers let their work out by contract to the stevedore contractors, who are either members of the union or are a little partial to them; consequently any not belonging to the union can be jumped by union men. Some lumbermen hire the men themselves, and load and unload their own vessels. According to a statement of a stevedore, not a member of any union, fifty or sixty men along the front do not get work from any one but from the dealers themselves. Such men can average \$60 a month by working for 45 cents per hour for nine hours a day.

The Steamship Stevedores is a protective association, with about seven hundred members. They work for 30 cents an hour, but can work for less when others, not members, are found doing it. In other words, they can work for what they please, as they dare not strike for solid wages, because of so many men being around who will work for almost anything. There are about four hundred men outside the union who work for reduced wages.

Among the foregoing organizations considerable rivalry and jealousy exist between the Stevedores Protective Union and the Riggers and Stevedores Union Association. The latter was instituted July 25, 1853, and is therefore one of the oldest labor organizations in the city. The initiation fee amounts to \$100, and it has a plethoric treasury. It has enjoyed almost a monopoly of the business, and at present controls the principal part of the stevedore business in San Francisco.

The Stevedores Protective Union is a young organization, without money in its treasury. The initiation fee is only \$1, and, therefore, lacking the necessary financial backing, the members find themselves crowded out of employment by those of the older body. The rates of wages in both are the same—\$5 per day. The members of the Stevedores Protective Union complain that they are constantly "jumped" or driven from work on vessels by those of the Riggers and Stevedores. The latter do not deny this, but claim a right to do so in the legitimate competition for preferment by master stevedores. They assert, and with reason, the rival organization, if they had the power, would pursue the same course which was now being carried out by the Riggers and Stevedores.

Very respectfully,

JOHN J. TOBIN,
Commissioner Bureau of Labor Statistics.

CHAPTER III.

PRINTERS IN SAN FRANCISCO AND OAKLAND—INVESTIGATION BY THE COMMISSIONER OF THE STATE BUREAU OF LABOR STATISTICS INTO THE CONDITION OF LABOR IN PRINTING ESTABLISHMENTS OF SAN FRANCISCO AND OAKLAND.

STATE OF CALIFORNIA,)
BUREAU OF LABOR STATISTICS, 220 SUTTER STREET,
SAN FRANCISCO, March 20, 1888. \

In consequence of communications received, and representations made to the State Bureau of Labor Statistics by committees from the Typographical Unions of San Francisco and Oakland, a special investigation into the condition of labor in printing establishments in these cities was made by the undersigned State Labor Commissioner.

Allegations made on behalf of the printers set forth that certain printing firms were paying their employés a lower rate of wages than the standard fixed by the Typographical Union, which represented all but a small minority of the printers in the State. This, they claimed, had a tendency to cripple, degrade, and demoralize the craft.

Women and girls were employed by these firms at less than one half the wages paid to the same class who worked in other places, and belonged to the Typographical Union. Boys and girls, under the name of apprentices, were engaged by the same firms in large numbers, who, without pay, or at mere nominal wages, took the places and partly did the work which men and women receiving union wages were doing at other establishments. Complaints were also made against the arbitrary, unjust, and sometimes coarse treatment of female employés. The point was made that by these discreditable methods of doing business, such firms could underbid others employing journeymen and women at full union rates, and employing only the number of apprentices allowed by the Typographical Union.

A large number of book and job printing establishments were visited on behalf of this bureau for the purpose of obtaining facts regarding management, wages, treatment of employés, sanitary conditions, etc.

The following schedule shows the number of male and female printers, union and non-union, and apprentices, in the establishments named, which comprise nearly all the book and job printing houses of San Francisco.

Pressmen, book-binders, lithographers, etc., are not included:

Book and Job Printing Houses, San Francisco.

NAME.	UNION.		NON-UNION.		APPRENTICES.	
	Male.	Female.	Male.	Female.	Boys.	Girls.
H. S. Crocker & Co.	22	—	7	—	12	—
Wilcox Bros.	—	—	2	—	1	—
W. A. Woodward & Co.	4	—	4	—	1	1
C. W. Gordon	—	—	1	—	1	1
M. Weiss	1	—	2	1	—	—
C. W. Nevin	3	—	1	—	—	2
W. C. Brown	2	—	—	1	5	—
W. M. Hinton	—	—	2	—	1	—
Donald Bruce	—	—	3	—	—	—
S. W. Raveley	—	—	1	1	1	—
Brunt & Fisher	1	—	1	—	2	—
B. F. Sterett	1	—	1	—	1	—

Book and Job Printing Houses, San Francisco—Continued.

NAME.	UNION.		NON-UNION.		APPRENTICES.	
	Male.	Female.	Male.	Female.	Boys.	Girls.
P. E. Dougherty			4		2	
Francis, Valentine & Co.	2		10	2	9	6
J. C. Howe & Co.			1	5	2	
Painter & Co.			1			
Winterburn & Co.	1		3		4	
Hasbrock				5		
D. J. Shine			1		1	
Thomas Printing Co.	2			1	3	
Fillmer & Stiller	16			8	1	1
Spaulding & Co.	6		4		7	
H. L. DeForrest			2			
Palmer & Rey	4		4	2	2	
R. Hill			1		1	
Rosenthal & Roesch			3		1	
H. E. Pastor				6	1	1
W. A. Bushnell	1	1				
Murdock & Co.	10				2	
J. Henderson & Co.	4			1		1
E. C. Hughes	2		2	4	1	
A. Lafontaine			1	1		
Stanley & Co.	1		3			
McCormick Bros.			3			
Bosqui Printing Co.	5				2	
J. R. Brodie & Co.	5				6	
A. L. Valleau			2		2	
Schmidt Label Co.			1		2	
Dodge Bros.			1		2	
Upton Bros.			2		1	
Occidental Printing Co.			2	4	3	
M. G. Tonini			2			
J. O. Jephson			2		2	
D. Lick			2	1		
W. H. Tobey			1	1		
J. H. Barry	3			1	2	
J. H. Leo & Co.			1		1	
Mrs. Richmond & Son	5	1	1		1	6
The Bancroft Company	8	1		3	5	2
Frank Eastman & Co.	7				2	
Totals.....	116	3	85	48	93	21

Total belonging to union, 119; total non-union, 133; total apprentices, 114.

Besides those enumerated in this schedule, there are about one hundred and fifty printers who have no permanent employment, and who shift around from place to place looking for a job where work is likely to be procured. These are chiefly non-union, and generally not expert at the business.

The total number of male and female printers in these book and job printing houses (excluding pressmen, etc.) is two hundred and fifty-two, and the number of apprentices one hundred and fourteen, or at the rate of one apprentice to about two and one fifth skilled mechanics. I do not believe there is to be found another trade where the number of apprentices bears so close a proportion to the number of journeymen and women. At this rate of increase there is little or no danger of a dearth of printers in the San Francisco market. As a general rule, apprentices receive no wages for the first three months; after that period they are paid from \$1 to \$3 per week. In many of these establishments the disproportionate number of apprentices is remarkable. In some they actually exceed the number of printers. The Typographical Union limits the number of apprentices to

one for every four journeymen. Francis, Valentine & Co. have fifteen apprentices to fourteen journeymen: Winterburn & Co., four to four; Spaulding & Co., seven to ten; J. R. Brodie & Co., six to five; A. L. Val-leau, and J. O. Jephson, each two to two; Mrs. Richmond & Son, seven to seven; C. W. Gordon, Schmidt Label Co., and Dodge Bros., each two to one; and W. C. Brown, five to three. Whether a tender solicitude for the welfare of the youth of both sexes, or a desire to put money in their purse, or a judicious admixture of both motives, actuates these firms in employ-ing so many juveniles, is not for me to determine.

The number of female printers in the job printing establishments who are members of the union is very small—only three out of a total of fifty-one.

The number of male union printers, on the contrary, exceeds that of non-union by thirty-one out of a total of two hundred and one, or they stand nearly in the ratio of three to two.

In most of the printing houses of San Francisco due regard is paid to cleanliness, light, ventilation, etc.; but some hold sacred dust and dirt, with their live concomitants. Separate water-closets for the sexes and proper washing facilities are not generally provided. In a few offices situated in the neighborhood of down town markets, the prevailing odors are not conducive to health or comfort. The location is not a matter of choice but of necessity, in consequence of the facilities for steam power afforded there. The firm of Fillmer & Stiller, with sixteen union male and eight non-union female printers, have only two apprentices. Murdock & Co., with ten male printers, and Frank Eastman & Co., with seven, have each two apprentices. It is to the credit of these establishments that no one can accuse them of trying to run their business with boy and girl cheap labor.

Further particulars regarding wages paid, etc., by the following firms, are subjoined: Bacon & Co., 508 Clay Street; Dewey & Co., 252 Market Street; R. G. Dun & Co., corner of Clay and Sansome Streets; H. E. Pastor, 712 Montgomery Street; Howe & Co., 615 Clay Street; Shearer & Co., ("Occident"), 429 Montgomery Street; Carlos White & Co., 320 Sansome Street; "Breeder and Sportsman" newspaper, 508 Montgomery Street.

Mr. Bacon, principal of the first named firm, received my deputy, Mr. John G. Leibert, Jr., very curtly, and refused to give the number of apprentices employed, or the rates of wages paid to his employé's. He said the number of women and girls employed was twenty. My agent learned after-ward from Mr. Bacon's forewoman that the number was only fourteen, of whom four were apprentices. The rates of wages paid were given to the latter as follows: 25 cents per 1,000 ems for composition on newspapers; 30 cents per 1,000 ems for composition on books.

Apprentices are bound by contract or indenture to serve a term of four years. For the first three months they receive no wages; for the next three months they are paid \$12 per month, and for every succeeding six months they receive \$3 per month advance. Ten per cent of this amount is retained by the principal as a guarantee for the fulfillment of the contract, and in case the apprentice should leave, or be discharged for cause, before the expiration of the term of apprenticeship, the whole amount so retained is forfeited. No interest is allowed on the wages kept back by Bacon & Co.

This contract or indenture is a remarkable document, on account of its one-sidedness, and demonstrates the necessity of having a good apprentice-ship law on our statute books. It hedges around the unfortunate apprentice with all kinds of obligations, with their corresponding penalties, of which the following is a specimen:

The said [name of apprentice] shall conform to all the rules and regulations now in force in the printing office of said parties of the second part, and to such changes as may

hereafter be made therein; and shall faithfully and diligently perform *all lawful work and labor in and about said employment that may be required of him*; and obey *all directions of said parties of the second part, within the scope of his employment*; and a failure, neglect, or refusal of said _____ to conform to said rules and regulations, and the changes thereof, that may hereafter be made, and to perform said work and labor, or *to obey said directions, or any of them*, shall be just cause for his discharge from said employment and for the *forfeiture of said reserved pay*.

It would be difficult to find anything to add to make it the more binding, or prevent any loophole for escape from its ironclad provisions.

On the other side, the employer is incased in solid armor against any and every attack against his person or pocket. The only obligation of duty entailing any effort on his part to teach the boy or girl the trade of printing is summed up in these words:

The said parties of the second part hereby agree to instruct the party of the third part in the business of printing, *through their employes, and not individually or personally*.

It is unnecessary to say the *italics* in the foregoing are not so italicised in the instrument. No penalty is provided for any failure or neglect on the part of Bacon & Co. to fulfill their part of the contract. In fact, either "individually or personally," they are under no obligation whatsoever.

If under such a condition of things, apprentices, past or present, of Bacon & Co. can be found, as no doubt they can, who have no word of complaint against the firm, it is fortunate for them that the delegated duty of teaching them their business fell to the hands of kind and competent persons, and that nothing gave occasion to the "party of the second part" to show his teeth or unglove his hand, to which this indenture gives such ponderous power.

Dewey & Co. pay 30 cents per 1,000 ems, and female compositors at this rate average \$9 to \$12 per week. Time workers are paid from \$7 to \$10 per week. There are eight girls in the composing room.

R. G. Dun & Co. pay 35 cents and 40 cents per 1,000 ems. Girls average from \$7 to \$10 per week.

H. E. Pastor pays 30 cents per 1,000 ems.

Howe & Co. pay 30 cents per 1,000 ems.

Shearer & Co., "Occident" newspaper, pay 30 cents per 1,000 ems.

"Breeder and Sportsman," newspaper, pays 35 cents per 1,000 ems.

The difference between the rates paid by the foregoing firms and those employing union printers can be seen by the following scale of wages laid down by the Typographical Union of San Francisco:

Morning newspapers, 50 cents per 1,000 ems.

Evening newspapers, 45 cents per 1,000 ems.

Book work, 40 cents per 1,000 ems.

Compositors employed by the week shall not receive less than \$18 per week.

From the testimony it will be seen that outside the question of wages, little or no fault could be found with the "Pacific Press Publishing House," and its management. The weight of evidence showed that the establishment was all that could be desired for the health, comfort, and moral welfare of the employes. Those in positions of trust treated those under them with kindness. Apprentices received unusual care and attention. Printers have good reason to protest against the one year term of apprenticeship for girls. The Malthusian theory can be invoked here. The increase in the family of printers would become so great by such an abnormal method of production that it would soon become a question of the "survival of the fittest." Superintendent Jones says that "the reason why the girls are taught the trade in one year, while the boys take three years, is that girls

devote themselves to but one department, while the boys *may* work in several branches."

But suppose boys wish to confine themselves to the one branch referred to, viz.: type setting, would the managers of the "Pacific Press" place them on the same level with the girls? If not, why should not the terms of both be placed on the same level of three years, and give no cause for printers to cry out against flooding the market with half or quarter fledged journeymen and women? The policy of displacing men, many of whom have families depending upon them for support, by the class referred to, is one of the crying evils of the times. With this one exception of a one-year term of apprenticeship for girls, the system of apprenticeship and the entire treatment of the apprentices in the "Pacific Press" establishment appeared to me to be excellent.

While Bacon & Co. and some other firms in San Francisco, referred to in the testimony, pay girls no wages for the first three months, the "Pacific Press" pays them \$3 a week. Again, it was shown, that unlike some of the San Francisco establishments, which depend mainly upon the labor of boys and girls, the "Pacific Press" has fewer apprentices to the number of journeymen and women than the rules of the Typographical Union permit. In giving the number of apprentices at thirty, out of a total of one hundred and seventy-five, it must be borne in mind, however, that most likely many of the women who are classed as journeywomen have served but one year as apprentices, and who would be classed as such for three succeeding years by the union. "Yearlings" are placed on the same footing with the "four-year-old." The term of girl apprenticeship is so short that the managers of the establishment could not readily inform me what was the exact number of apprentices now at work. They were in the same difficulty as a prolific Mormon would probably be in reciting, off-hand, the full name of each male and female of his numerous progeny.

The question of wages is, however, the core of contention between the Typographical Union and the "Pacific Press." It should be a matter of touching interest to the employes of the latter as well, because, admirable as the "Pacific Press" establishment is in all its appointments, the old saying still holds true: "A man can starve though he lives in a palace."

The "Pacific Press" scale of prices for composition is 30 cents per 1,000 ems.

Foreman in each department, \$18 per week.

Forewomen in each department, \$9 per week.

Proof-reader, male, \$18 per week.

Proof-reader, female, \$9 per week.

Journeymen in each department, \$15 per week.

Women compositors, time workers, \$9 per week.

Apprentices, both sexes, \$3 per week for first six months, increasing \$1 per week semi-annually.

Upon looking at this scale of wages, a person is immediately struck with the remarkable discrepancy between the wages paid to men as compared with those paid to women.

In the case of proof-reader, the men receive precisely double the wages of the women. One of the witnesses, Miss Emma Boyd (who is at present proof-reader on the "Pacific Press"), when asked why she was paid only half the wages paid to men, answered: "Because I served my apprenticeship there." A person unversed in Adventist methods would imagine that such would be the very reason why she should receive more. In the other departments women receive about three fifths of the wages paid to men.

One of the officers of this association confessed to me that the women

are underpaid. If he had added to this that, as compared to the rates paid to men, the women were *unjustly* paid, he would, in my opinion, express the situation properly. The Typographical Union have just reason to feel proud of their treatment, in this regard, of the female members of their craft. Equal work, equal pay, for both sexes, is the rule of the union. Equal term of apprenticeship for both sexes. A man and a woman standing side by side before their cases, and doing the same amount of work, receive at the end of the week precisely the same wages.

The union rates for composition in Oakland is 35 cents per 1,000 ems. Journeymen receive \$18 per week. The testimony shows a wide divergence between the amounts actually earned by compositors working by the piece in the "Pacific Press," and in some of the daily newspapers in Oakland.

The indefatigable manager of the "Pacific Press," Mr. C. H. Jones, whilst acknowledging that "it is true that in some cases the rate of wages is not quite so high," yet offsets the defect by the assurance that "a man is sure of steady employment for six days in the week, no matter whether work is heavy or light, while in other offices a man is liable to be laid off at any time. So that in a year a man will actually receive more at the 'Pacific Press' than he would at the same work in other offices."

This is a good argument on the part of the manager, and deserves due consideration. No doubt similar printing houses in San Francisco, and other places, could advance the same argument, for the probability is when business become slack, it is the houses which pay full market rates must first let go, while those employing cheap labor can afford to hold on.

The managers of the "Pacific Press" claim that it is an institution founded for the express purpose of publishing and circulating religious literature. It is owned by stockholders. All the profits are devoted to enlarging the business, increasing its facilities, or forwarding Christian missionary enterprises.

Mr. Jones, the Superintendent, in his testimony, said: "You do not understand the nature of our institution; it is a religious establishment. If the employés have a wish to work for less wages than they could get elsewhere, and consider that they are giving so much to the cause, they have the same right to do so that you would to give a part of your wages to charity." Here is the turning point of the whole matter in dispute between the Typographical Union and the "Pacific Press." Undoubtedly the employés of the "Pacific Press" have a perfect legal and moral right to work for what wages they please, and do what they please with their wages. What is commendable in itself may, however, prove an evil by infringing upon the rights of our neighbor. To devote one's wages to the spread of the gospel may be praiseworthy, but to be the means of lowering the standard of wages, inflicts injury upon my fellow craftsman. So that whilst doing good to the heathen in foreign lands, I am doing harm to the Christian at my own doors.

Could not the same object be attained, and the same funds be supplied for religious purposes, if the employés were paid the regular standard of wages, and the difference between that standard and the present rates turned back as "offerings" into the church treasury?

For instance, the printer who is now paid \$15 per week, while the standard of wages is \$18, could be paid the latter amount, and he could then return \$3 to the church treasury as a donation. It is of general repute that religious newspapers, weekly and monthly, pay the lowest rates for composition. They may throw in enough of the "spiritual" to counterbalance the lack of the "temporal," for aught I can say, but the employés

are in some way reconciled to the sacrifice, for Superintendent Jones says: "Those who love justice and eschew evil esteem it a privilege to work in our office."

Most likely the heads of some of the printing firms in San Francisco whose methods of doing business have been investigated, would console themselves in a similar strain.

The firm of Bacon & Company, though not a religious concern, claims to be a philanthropic one, on the ground of the large number of boys and girls to whom it has imparted a knowledge of the printing business. This firm takes exception to the rule of the Typographical Union limiting the number of apprentices. This they have a perfect right to do, for the question as to what number of apprentices should be allowed in any craft, or how they should be regulated, is an open and most momentous one.

"By their (the union) rule," say the firm, "Bacon & Co. would be allowed two apprentices where now they are training ten." This is a confession on the part of said firm that they are training five times the number of apprentices which the Typographical Union judges to be consistent with the welfare of their craft.

Bacon & Company complain because the Typographical Union fixes \$18 per week as the scale for journeymen, when, as they say, "a man may be willing, *glad*, to work at a steady situation for \$12 or \$15." It is hard to believe that men with "glad" hearts will work for such firms at *two thirds* the rate of wages paid to their fellow craftsmen in other establishments.

If the Typographical Union should reduce the scale to \$12 or \$15, just such firms as Bacon & Company would find men who would "be willing, *glad*, to work at a steady situation" for \$8 or \$10 per week. They keep always sitting on the mechanic's safety valve. No wonder that printing firms paying standard, or union rates, find it hard and unprofitable to compete with establishments like the "Pacific Press," Bacon & Company, etc., which pay lower wages and have an unlimited number of apprentices.

It is to be hoped, as one good result of this investigation, that on both sides men will act calmly and dispassionately, so that a *modus vivendi* will be reached without resorting to methods which can only be productive of ill will, and possibly of future evil.

Very respectfully,

JOHN J. TOBIN,
Commissioner.

LETTER TO THE "PACIFIC PRESS."

The following admirable letter from a large dry goods firm to the managers of the "Pacific Press," puts the case of the printers in such a clear and convincing manner that it is well worthy of insertion here.

As a vindication of the right of the labor organizations to combine and make such regulations as they consider necessary to protect and promote their interests, this letter deserves careful perusal:

"Pacific Press," Oakland:

GENTLEMEN: As you are aware, we have been waited upon by a committee of wage earners with the request that we withhold our patronage from your house, on the grounds that the policy pursued by your establishment is one tending to lower the standard of wages among the craftsmen in your trade. We declined to comply with this request until we could inquire into the merits of the case and learn for ourselves the points at issue.

With this object in view we invited a call from Labor Commissioner Tobin, who had recently made an investigation of your concern, and we also invited a call from your management. After a thorough inquiry into the matter we find that there is much to commend in your institution and in many of your methods. That in many directions you are doing a good work, and show a generous and self-sacrificing spirit. But we also find that on the question of wages you are, in our judgment, pursuing a policy that must prove injurious to labor generally, and to the craft which your trade represents, in particular.

We fully recognize your right to pay your employes what you please. We fully recognize the right of your employes to accept as much or as little for their labor as you are willing to give and they to take. We fully recognize the right on the part of employes to do what they please with their earnings—to spend it in whisky if they choose, or to use a share of it or all for religious or benevolent purposes. These are privileges that are guaranteed us by the laws of our country; privileges with which no man has a right to interfere. But we also recognize your right and our right to withhold employment from those who are undeserving, and to withhold our patronage from individuals or institutions whose policies may be such as to affect the welfare of our community or our State.

We cannot hope to attain a high standard of civilization with a low standard of wages. We believe that if the wide gap is to be maintained between the condition of the intelligent and prosperous wage earners of this country, and the paupered and wretched laborers of Europe, we must check and discourage every tendency toward cheap labor. This nation cannot be more enlightened nor more advanced socially or morally than are its people, and anything that helps reduce the earnings of its toilers must result in lowering the social, moral, and mental standard of the nation. We therefore trust that you will pardon the liberty we take in saying that we must disapprove of your policy on the wage question.

We should not feel called upon to write these things were it not that your Mr. Saunders requested us to let you know our conclusions, and, since we tell you our conclusion, we feel it is but proper to point out the reasons that have led us to this conclusion. We are told that you maintain that the difference between the standard wages and the wages paid by you, is simply a contribution toward your cause on the part of your employes.

While this may be so, it does not alter the fact that you establish a standard of wages against which others paying full rates cannot hope to compete. If your institution was small or obscure, it might have little or no influence on the wages of others. But standing as it does at the head, and employing as it does a larger number of people than any similar concern on the coast, it becomes a powerful factor in the labor market, and in the end must not alone result in forcing the wages of the craft down to your standard, but in the meanwhile it gives other employers the pretext of lowering wages in order, as they say, to successfully compete with you.

We believe that you will agree with us, that whatever tends to lower the standard of wages also tends to lower the standard of good citizenship, and if it is not your intention to lower the standard of wages received by others, then why would it not be well to pay standard wages, at least on such secular work as is a matter of general competition, permitting such of your employes as choose, to pay back into the church treasury this difference in wages? There are reasons that have been advanced by Mr. Saunders against this idea. The first is, that it would look like a subterfuge on your part, and smack of deceit; the other is, that it would seem as if you had surrendered to outside influences, involving on your part a sense of humiliation, and lastly, that an advance in wages might cause a loss of business.

The answer to the first objection would be that the world does not hold us responsible for what others say, but for what we ourselves do. So long as when bidding on work you would honestly base your calculations on and actually pay your employes standard wages, even though your employes should choose to pay 90 per cent of such wages into your church treasury, you could well afford to let others say what they please. It could not then be held against you that you were basing your bids on a low scale of wages, which in the end must compel others to do the same, nor could it then be said that your influence was tending to lower the plane of outside labor, while as a religious organization your aim should be the very opposite.

As to the second objection, namely, that to pay standard wages, after all that has been said and done, would seem as if you had surrendered to outside influence, thus involving, on your part, a sense of humiliation, we would answer that the question at issue should not be one of pride, but one of right and justice. It would seem to us that if you should find that you had unconsciously or otherwise been lowering the general standard of wages, that you would, without hesitation, and regardless of pride, correct this matter.

It would seem to us that you would the more readily correct an unwise policy, from the very fact of being not a secular concern, but an institution working in the interest of religion. Religion, as we understand it, is that which tends to elevate and make men better. And yet we know of nothing that is more likely to defeat the high aims of a broad spirit of religion than a low standard of wages. As for the last objection raised, namely, that an advance in wages might mean a loss of business, we should judge that you have little to fear in that direction. With your superb facilities and your improved methods of machinery, you should be able to more than successfully compete with others, even on the same wage scale. From an estimate made while your Mr. Saunders was here, it was found that on a contract, such as ours for the spring catalogue, the difference in your bid, had you been paying standard wages, would not have exceeded six per cent additional. It would, therefore, seem to us that unless there are other strong reasons, which thus far have not been presented, that by paying standard wages you neither do yourselves, your employes, nor your patrons an injustice; while by adhering to your present policy it must be held against you with telling force that your influence on the labor market is downward instead of upward.

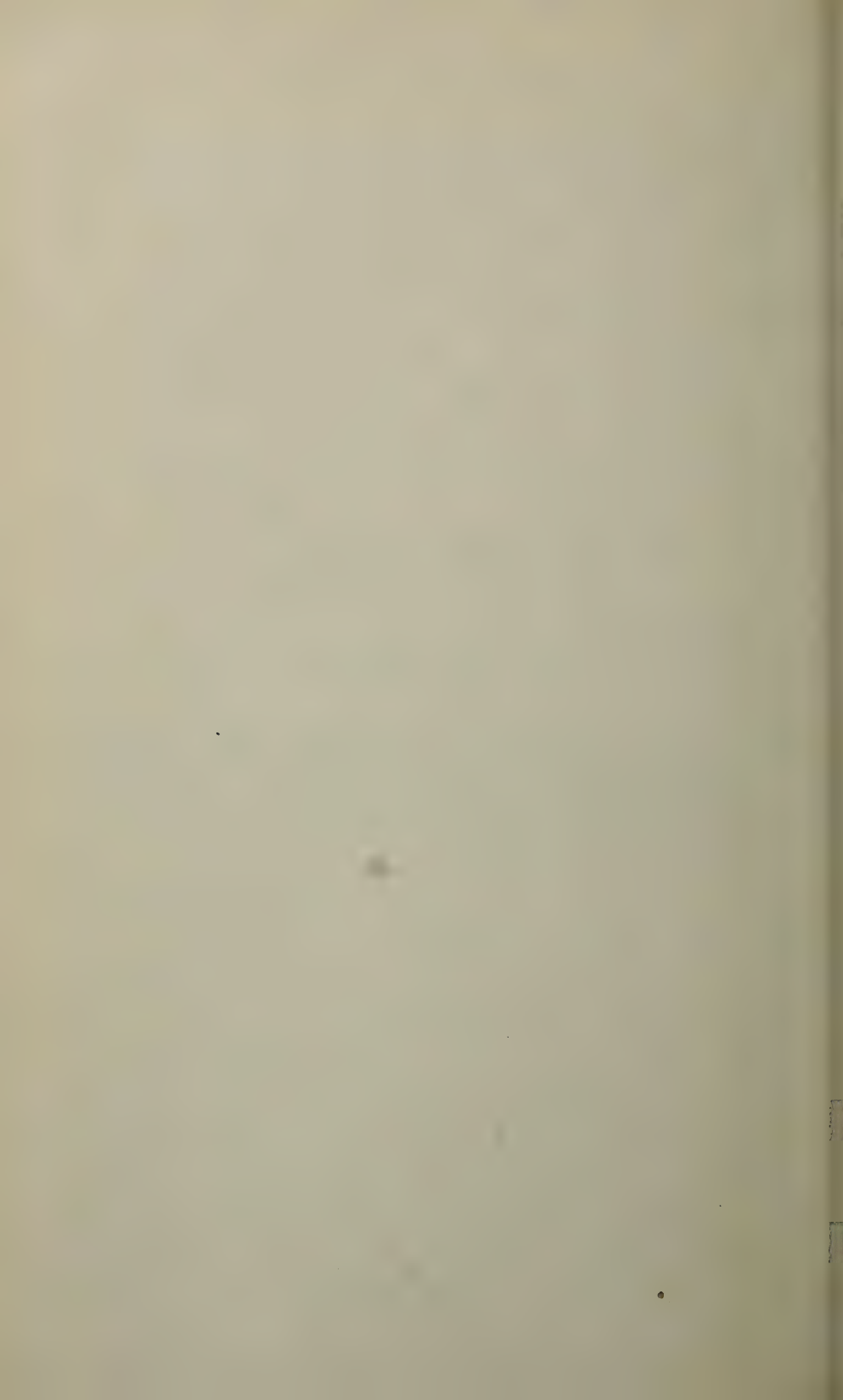
As merchants, we deem it unwise to support any policy that tends to diminish the income of wage earners and consumers. As citizens, we should feel it unpatriotic to encourage any institution whose influence tends to lower the scale of wages, which in turn must lower the standard of good citizenship.

Yours truly,

APPENDIX.

LABOR LAWS.

Building and Loan Association Laws of Massachusetts—Building and Loan Association Laws of Maine—Apprentice Laws of New York—Massachusetts Laws for the Employment of Children—Massachusetts Laws for the Prevention of Accidents in Factories.



APPENDIX.

LABOR LAWS.

BUILDING AND LOAN ASSOCIATION LAWS OF MASSACHUSETTS.

SECTION 1. Twenty-five or more persons, who associate themselves together by an agreement in writing, with the intention of forming a corporation for the purpose of accumulating the savings of its members paid into such corporation in fixed periodical installments, and lending to its members the funds so accumulated, shall be and remain a corporation complying with the provisions of the three following sections.

SEC. 2. The agreement shall set forth the fact that the subscribers thereto associated themselves with the intention of forming a corporation; the name by which the corporation shall be known; the purpose for which it is formed; the town or city, which shall be within this Commonwealth, in which it is located; and the limit of capital to be accumulated.

SEC. 3. The name shall be one not previously in use by any existing corporation established under the laws of this Commonwealth, and shall be changed only by an act of the general Court. The words "coöperative saving fund and loan association" shall form a part of the name. Section three of chapter one hundred and seventeen of the Public Statutes, relative to the name of coöperative saving fund and loan associations, is hereby amended by striking out the words "coöperative saving fund and loan association," in the fourth line, and inserting in place thereof the words "coöperative bank." The title of said chapter one hundred and seventeen of the Public Statutes is hereby amended by striking out the words "saving fund and loan associations," and inserting in place thereof the word "banks." The names of all coöperative saving fund and loan associations heretofore organized are hereby changed by striking out in each the words "saving fund and loan association," and inserting in place thereof the word "bank," and they shall hereafter be known as "coöperative banks." The first and second sections of this Act shall take effect upon its passage, and the third section upon the first day of July, in the year eighteen hundred and eighty-three.

SEC. 4. The provisions of sections eighteen, twenty, and twenty-one, of chapter one hundred and six, shall apply to such corporations, except that, in the certificate signed by the Secretary of the Commonwealth, the limit of capital to be accumulated, as fixed in the agreement of association, and shall be inserted, by said section twenty-one, to be filled and recorded, may be signed and sworn to by the presiding and financial officers, and a majority at least of the officers possessing the power of Directors by whatever name they may be called, and that the fees to be paid for filing and recording the certificates required by said section twenty-one, including the issuing of the certificate of organization, shall be five dollars.

SEC. 5. The capital to be accumulated shall not exceed one million dollars, and shall be divided into shares of the ultimate value of two hundred dollars each. The limitation of capital to be accumulated in any coöperative bank now organized, or hereafter formed under the provisions of chapter one hundred and seventeen of the Public Statutes, shall be held to apply to capital actually paid in, and no such bank shall be restrained from issuing shares so long as the capital actually paid in on shares is not in excess of one million dollars. The shares may be issued in quarterly, half yearly, or yearly series, in such amounts and at such times as the members may determine. No person shall hold more than twenty-five shares in the capital of any one such corporation. No shares of a prior series shall be issued after the issue of a new series.

SEC. 6. The number, title, duties, and compensation of the officers of the corporation, their terms of office, the time of their election, as well as the qualifications of electors, and time of each periodical meeting of the officers and members, shall be determined by the by-laws; but no member shall be entitled to more than one vote at any election. All officers shall continue in office until their successors are duly elected, and no corporation shall expire from neglect on its part to elect officers at the time prescribed by the by-laws. In any coöperative bank now or hereafter formed under the provisions of chapter one hundred and seventeen of the Public Statutes, the offices of Secretary and Treasurer may be held by one and the same person.

SEC. 7. The officers shall hold stated monthly meetings. At or before each of these meetings every member shall pay to the corporation, as a contribution to its capital, one

dollar as dues upon each share held by him, until the share reaches the ultimate value of two hundred dollars, or is withdrawn, canceled, or forfeited. Payment of dues on each series shall commence from its issue.

SEC. 8. A member may withdraw his unpledged shares at any time by giving thirty days' notice of his intention so to do, written in a book held and provided by the corporation for that purpose. Upon such withdrawal the shareholder's account shall be settled as follows: From the amount then standing to the credit of the shares to be withdrawn there shall be deducted all fines, a proportionate part of any unadjusted loss, together with such proportion of the profits previously credited to the shares as the by-laws may provide, and such shareholders shall be paid the balance; *provided*, that at no time shall more than one half of the funds in the treasury be applicable to the demands of withdrawing members, without the consent of the Directors. The Directors may, at their discretion, under rules made by them, retire the unpledged shares of any series at any time after four years from the date of their issue, by enforcing the withdrawal of the same; but whenever there shall remain in any series, at the expiration of five years after the date of its issue, an excess above one hundred unpledged shares, then it shall be the duty of the Directors to retire annually twenty-five per centum of such excess existing at said expiration of five years after the date of its issue, so that no more than one hundred unpledged shares shall remain in such series at the expiration of nine years from the date of its issue; and thereafter the Directors may, in their discretion, retire such other unpledged shares as they consider to the best interests of the bank to require; *provided*, that whenever under the provisions of this section the withdrawal of shares is to be enforced, the shares to be retired shall be determined by lot, and the holders thereof shall be paid the full value of their shares, less all fines and a proportionate part of any unadjusted loss; *provided also*, that shares pledged for share loans shall be treated as unpledged shares. Shares may be issued in the name of a minor, and if so issued, may, at the discretion of the Directors, be withdrawn, in manner as provided in section two of this Act, by such minor, the parent or guardian of such minor, and in either case payments made on such withdrawal of shares shall be valid. When a share or shares are held by any one in trust for another, the name and residence of the person for whom such share or shares are held shall be disclosed, and the account shall be kept in the name of such holder as trustee for such person; and if no other notice of the existence and terms of such trust has been given in writing to the corporation, in the event of the death of the trustee, such shares may be withdrawn by the person for whom such deposit was made, or by his legal representatives.

SEC. 9. When each unpledged share of a given series reaches the value of two hundred dollars, all payments of dues thereon shall cease, and the holder thereof shall be paid, out of the funds of the corporation, two hundred dollars thereof, with interest at the rate of six per cent a year from the time of such maturity to the time of payment; *provided*, that at no time shall more than one half of the funds in the treasury be applicable to the payment of such mature shares without the consent of Directors; *provided further*, that when any series of shares, either pledged or unpledged, reaches maturity between the dates of adjustment of profits, or whenever shares are retired between such dates, the holders of such shares shall, in addition to the value thereof, be entitled to interest at the rate of six per cent per annum for all full months from the date of the preceding adjustment. Chapter one hundred and seventeen of the Public Statutes is amended as follows, by adding to section nine the following words: "And that before paying matured shares all arrears and fines shall be deducted."

SEC. 10. The moneys accumulated, after due allowance made for all necessary and proper expenses, and for the withdrawal of shares, shall, at each stated monthly meeting, be offered to the members, according to the premiums bid for them for priority of right to loan. Each member whose bid is accepted shall be entitled, upon giving proper security, to receive a loan of two hundred dollars for each share held by him, or such fractional part of two hundred dollars as the by-laws may allow. If a balance of money remains unsold after a monthly sale, the Directors may invest the same in any of the securities named in the second clause of section twenty of chapter one hundred and sixteen.

SEC. 11. Premiums for loans shall consist of a percentage charged on the amount lent, in addition to interest, and shall be deemed to be a consideration paid by the borrower for the present use and possession of the future or ultimate value of his shares, and shall, together with interest and fines, be received by the corporation as a profit on the capital invested in the loan, and shall be distributed to the various shares and series of said capital, as hereinafter provided.

SEC. 12. A borrowing member, for each share borrowed upon, shall, in addition to his dues and monthly premium, pay monthly interest on his loan, at the rate of six per cent per annum, until his shares reach the ultimate value of two hundred dollars each, or the loan has been repaid; and when said ultimate value is reached, said shares and loan shall be declared canceled and satisfied, and the balance, if any, due upon the shares shall be paid to the member. Any corporation organized under said chapter one hundred and seventeen may provide in its by-laws that the bid for loans at its stated monthly meetings shall, instead of a premium, be a rate of annual interest upon the sum desired, payable in monthly installments. Such bids shall include the whole interest to be paid, and may be at any rate not less than five per cent per annum.

SEC. 13. For every loan made a note, secured by first mortgage of real estate, shall be given, accompanied by a transfer and pledge of the shares of the borrower. The shares so pledged shall be held by the corporation as collateral security for the performance of

the conditions of said note and mortgage. Said note and mortgage shall recite the number of shares pledged, and the amount of money advanced thereon, and shall be conditioned for the payment, at the stated meetings of the corporation, of the monthly dues on said shares, and the interest and premium upon the loan, together with all fines on payments in arrears, until said shares reach the ultimate value of two hundred dollars each, or said loan is otherwise canceled or discharged; *provided*, that the shares, without other security, may, in the discretion of the Directors, be pledged as a security for loans to an amount not exceeding their value as adjusted at the last adjustment and valuation of shares before the time of the loan. If the borrower neglects to offer security satisfactory to the Directors, within the time prescribed by the by-laws, his right to the loan shall be forfeited, and he shall be charged with one month's interest and one month's premium, at the rate bid by him, together with all expenses, if any, incurred; and the money appropriated for such loan may be reloaned at the next or any subsequent meeting.

Sec. 14. A borrower may repay a loan at any time, upon application to the corporation; whereupon, on settlement of his account, he shall be charged with the full amount of the original loan, together with all monthly installments of interest, premiums, and fines in arrears; shall be given credit for the withdrawing value of his shares pledged and transferred as security, and the balance shall be received by the corporation in full satisfaction and discharge of said loan; *provided*, that all settlements made at periods intervening between stated meetings of the Directors shall be made as of the date of the stated meetings next succeeding such settlement; and *provided*, that a borrower desiring to retain his shares and membership may, at his option, repay his loan without claiming credit for said shares. Whereupon, said shares shall be retransferred to him, and shall be free from any claim by reason of said canceled loan. Partial payment of loans on real estate made by any cooperative bank may be received in sums of fifty dollars, or any multiple thereof; and for each two hundred dollars so repaid, one share of stock shall be released from pledge.

Sec. 15. Members who make default in the payment of their monthly dues, interests, and premiums, shall be charged a fine not exceeding two per cent a month on each dollar in arrears. No fines shall be charged after the expiration of six months from the first lapse in any such payment, nor upon a fine in arrears. The shares of a member who continues in arrears more than six months, shall, at the option of the Directors, if the member fails to pay the arrears within thirty days after notice, be declared forfeited, and the withdrawing value of the shares at the time of the first default shall be ascertained, and after deducting all fines and other legal charges, the balance remaining shall be transferred to an account to be designated the "Forfeited Share Account," to the credit of the defaulting member. Said member, if not a borrower, shall be entitled, upon thirty days' notice, to receive the balance so transferred, without interest, from the time of the transfer, in the order of his turn, out of the funds appropriated to the payment of withdrawals. All shares so forfeited or transferred shall cease to participate in any profits of the corporation accruing after the last adjustment and valuation of shares before said first default.

Sec. 16. If a borrowing member is in arrears for dues, interest, premiums, or fines for more than six months, the Directors may, at their discretion, declare the shares forfeited, after one month's notice, if the arrears continue unpaid. The account of such borrowing member shall then be debited with the arrears of interest, "premium," and fines of date of forfeiture, and the shares shall be credited upon the loan at their withdrawing value. The balance of the account may, and after six months shall, be enforced against the security, and be recovered as secured debts are recovered at law.

Sec. 17. The general accounts of every such corporation shall be kept by double entry. All moneys received by the corporation from each member shall be receipted for by persons designated by the Directors, in a pass-book provided by the corporation for the use of, and to be held by, the member; and said pass-book shall be plainly marked with the name and residence of the holder thereof, the number of shares held by him, and the number or designation of the series or issue to which said shares respectively belong, and the date of the issue of such series. All moneys so received shall be originally entered by the proper officer in a book to be entitled the "cash book," to be provided by the corporation for the purpose, and the entries therein shall be so made as to show the name of the payer, the number of shares, the number or designation of the series or issue of the particular share or shares so entered, together with the amount of dues, interest, premiums, and fines paid thereon, as the case may be. Each payment shall be classified and entered into a column devoted to its kind. Said cash book shall be closed after the termination of each stated meeting, and shall be an exhibit of the receipts of all moneys paid at said meeting. All payments made by the corporation for any purpose whatsoever shall be by order, check, or draft upon the Treasurer, signed by the President and Secretary, and indorsed by the person in whose favor the same are drawn. The name of the payee, the amount paid, and the purpose, object, or thing for which the payment is made, together with its date, shall be entered on the margin of said order, check, or draft. The Treasurer shall dispose of and secure the safe keeping of all moneys, securities, and property of the corporation, in the manner designated by the by-laws, and the Treasurer and Secretary shall give such security for the faithful performance of their respective duties as the by-laws may direct.

Sec. 18. The profits and losses may be distributed annually, semi-annually, or quarterly, to the shares then existing, but shall be distributed at least once in each year, and whenever a new series of shares is to be issued. Profits and losses shall be distributed to the various shares existing at the time of said distribution in proportion to their value at that time, and shall be computed upon the basis of a single share fully paid to the date of

distribution. Losses shall be apportioned immediately after their occurrence. At each periodical distribution of profits the Directors shall reserve, as a guaranty fund, a sum not less than one nor more than five per cent of the net profits accruing since the next preceding adjustment, until such fund amounts to five per cent of the dues capital, which fund shall thereafter be maintained and held; and said fund shall be at all times available to meet losses in the business of the corporation from depreciation of its securities, or otherwise.

SEC. 19. Any such corporation may purchase in any sale, public or private, any real estate upon which it may have a mortgage, judgment, lien, or other incumbrance, or in which it may have an interest; and may sell, convey, lease, or mortgage, at pleasure, the real estate so purchased to any person or persons whatsoever. All real estate so acquired shall be sold within five years from the acquisition of the title thereto.

SEC. 20. The Commissioners of Savings Banks shall perform, in reference to every such corporation, the same duties, and shall have the same powers, as are required of or given to them in reference to savings banks, and shall annually make report to the general Court of such facts and statements respecting such associations, and in such forms as they deem that the public interest requires. Every officer of such corporation shall answer truly all inquiries made, and shall make all returns required by the Commissioners.

DIGEST OF BUILDING AND LOAN ASSOCIATION LAWS OF MAINE.

Chapter forty-seven of the Revised Statutes is hereby amended by striking out sections one hundred and thirty-four, one hundred and thirty-five, one hundred and thirty-six, one hundred and thirty-seven, and one hundred and thirty-eight of said chapter forty-seven, and inserting instead thereof the following:

SECTION 134. The capital to be accumulated shall not exceed one million dollars, and shall be divided into shares of the ultimate value of two hundred dollars each. The shares may be issued in quarterly, half yearly, or yearly series, in such amounts and at such times as the members may determine. No person shall hold more than twenty-five shares in the capital of any one such association. No shares of a prior series shall be issued after the issue of a new series.

SEC. 135. The number, title, duties, and compensation of the officers of the association, their terms of office, the time of their election, as well as the qualifications of electors, and time of each periodical meeting of the officers and members, shall be determined by the by-laws, but no member shall be entitled to more than one vote. All officers shall continue in office until their successors are duly elected, and no association shall expire from neglect on its part to elect officers at the time prescribed by the by-laws.

SEC. 136. The officers shall hold stated monthly meetings. At or before each of these meetings, every member shall pay to the association, as a contribution to its capital, one dollar, as dues upon each share held by him, until the share reaches the ultimate value of two hundred dollars, or is withdrawn, canceled, or forfeited. Payment of dues on each series shall commence from its issue.

SEC. 137. Shares may be withdrawn after one month's notice of such intention, written in a book held and provided by the association for the purpose. Upon such withdrawal, the shareholder's account shall be settled as follows: From the amount then standing to the credit of the shares to be withdrawn, there shall be deducted all fines, a proportionate part of any unadjusted loss, together with such proportion of the profits previously credited to the shares as the by-laws may provide, and such shareholder shall be paid the balance; *provided*, that at no time shall more than one half of the funds in the treasury be applicable to the demands of withdrawing members, without the consent of the Directors. The Directors may, at their discretion, under rules made by them, retire the unpledged shares of any series at any time after four years from the date of their issue, by enforcing the withdrawal of the same; *provided*, that the shareholders whose shares are to be retired shall be determined by lot, and that they shall be paid the full value of their shares, less all fines and a proportionate part of any unadjusted loss.

SEC. 138. When each unpledged share of a given series reaches the value of two hundred dollars, all payments of dues thereon shall cease, and the holder thereof shall be paid, out of the funds of the association, two hundred dollars therefor, with interest at the rate of six per cent a year, from the time of such maturity to the time of payment; *provided*, that at no time shall more than one half of the funds in the treasury be applicable to the payment of such matured shares, without the consent of the Directors, and that before paying matured shares all arrears and fines shall be deducted. Every share shall be subject to a lien for the payment of any unpaid dues, fines, interest, premiums, and other charges received thereof, which may be enforced in the manner hereinafter provided.

SEC. 139. The moneys accumulated, after due allowance made for all necessary and proper expenses, and for the withdrawal of shares, shall, at each stated monthly meeting, be offered to members according to the premiums bid by them for priority of right to a loan. Each member, whose bid is accepted, shall be entitled, upon giving proper security, to receive a loan of two hundred dollars for each share held by him, or such fractional part of two hundred dollars as the by-laws may allow. If a balance of money remains unsold after a monthly sale, the Directors may invest the same in any of the securities named in section one hundred, of chapter forty-seven, Revised Statutes, providing for investments of deposits of savings banks. Any association organized as aforesaid, may provide in its by-laws that the bid for loans at its stated monthly meetings shall, instead

of a premium, be a rate of annual interest upon the sum desired, payable in monthly installments. Such bids shall include the whole interest to be paid, and may be at any rate not less than five per cent per annum.

SEC. 140. Premiums for loans shall consist of a percentage charged on the amount lent, in addition to interest, and shall be deemed to be a consideration paid by the borrower for present use and possession of the future or ultimate value of his shares, and shall, together with interest and fines, be received by the association as a profit on the capital invested in the loan, and shall be distributed to the various shares and series of said capital as hereinafter provided.

SEC. 141. A borrowing member, for each share borrowed upon, shall, in addition to his dues and monthly premium, pay monthly interest on his loan at the rate of six per cent per annum until his shares reach the ultimate value of two hundred dollars each, or the loan has been repaid; and when said ultimate is reached, said shares and loan shall be declared canceled and satisfied, and the balance, if any, due upon the shares shall be paid to the member.

SEC. 142. For every loan made, a note secured by first mortgage of real estate shall be given, accompanied by a transfer and pledge of the shares of the borrower. The shares so pledged shall be held by the association as collateral security for the performance of the conditions of the note and mortgage. Said note and mortgage shall recite the number of shares pledged and the amount of money advanced thereon, and shall be conditional for the payment, at the stated meetings of the corporation, of the monthly dues on said shares, fines on payments in arrears, until said shares reach the ultimate value of two hundred dollars each, or said loan is otherwise canceled or discharged; *provided*, that the shares, without other security, may, in the discretion of the Directors, be pledged as security for loans to an amount not exceeding their value as adjusted at the last adjustment and valuation of shares before the time of the loan. If the borrower neglects to offer security satisfactory to the Directors, within the time prescribed by the by-laws, his right to the loan shall be forfeited, and he shall be charged with one month's interest and one month's premium at the rate bid by him, together with all expenses, if any, incurred, and the money appropriated for such loan may be reloaned at the next or any subsequent meeting.

SEC. 143. A borrower may repay a loan at any time, upon application to the association, whereupon, on settlement of his account, he shall be charged with the full amount of the original loan, together with all monthly installments of interest, premium, and fines in arrears, and shall be given credit for the withdrawing value of his shares pledged and transferred as security, and the balance shall be received by the association in full satisfaction and discharge of said loan; *provided*, that all settlements made at periods intervening between stated meetings of the Directors shall be made as of the date of the stated meeting next succeeding such settlement; *and provided*, that a borrower desiring to retain his shares and membership may, at his option, repay his loan without claiming credit for his shares, whereupon said shares shall be retransferred to him, and shall be free from any claim by reason of said canceled loan.

SEC. 144. Members who make default in the payment of their monthly dues, interest, and premiums, shall be free from any claim by reason of said canceled loan.

SEC. 144. Members who make default in the payment of their monthly dues, interest, and premiums, shall be charged a fine not exceeding two per cent a month on each dollar in arrears. No fines shall be charged after the expiration of six months from the first lapse in any such payment, or upon a fine in arrears. The shares of a member who continues in arrears more than six months shall, at the option of the Directors, if the member fails to pay the arrears within thirty days after notice, be declared forfeited, and the withdrawing value of the shares at the time of the first default shall be ascertained, and after deducting all fines and other legal charges, the balance remaining shall be transferred to an account, to be designated the forfeited share account, to the credit of the defaulting member. Said member, if not a borrower, shall be entitled, upon thirty days' notice, to receive the balance so transferred, without interest from the time of the transfer, in order of his turn, out of the funds appropriated to the payment of withdrawals. All shares so forfeited or transferred shall cease to participate in any profits of the association accruing after the last adjustment and valuation of shares before said default.

SEC. 145. If a borrowing member is in arrears for dues, interest, premiums, or fines for more than six months, the Directors may, at their discretion, declare the shares forfeited, after one month's notice, if the arrears continue unpaid. The account of such borrowing member shall then be debited with the arrears of interest, premiums, and fines to date of forfeiture, and the shares shall be credited upon the loan at their withdrawing value. The balance of the account may, and after six months shall, be enforced against the security of any legal method, or by proceedings in equity, for sale and foreclosure, jurisdiction therefor being hereby specially given to the Supreme and Superior Courts, to be exercised upon bill or petition, in a summary manner. The shares, the value whereof has been so applied in payment, shall revert to the corporation, and be held by it free from all interest, claim, or demand on the part of the borrower, or any person claiming from or under him.

SEC. 146. Upon the death of a shareholder, his legal representatives shall be entitled to receive the amount of unpledged shares of the deceased, to be ascertained as provided in section one hundred and thirty-seven for withdrawal of shares. No fines shall be charged, or profit credited, to a deceased member's account from and after his decease, unless his legal representatives assume the future payments on such shares, which they may assume

under the same rights and liabilities of the deceased. Money received for the shares of a deceased shareholder, or the shares themselves, as the case may be, shall descend to the same persons, and be distributed in the same manner that money received from a policy of life insurance on the life of a deceased person now does by law.

SEC. 147. The general accounts of every such association shall be kept by double entry. All moneys received by the association from each member shall be receipted for by persons designated by the Directors, in a pass-book provided by the association, for the use of, and to be held by the member, and said pass-book shall be plainly marked with the name and residence of the holder thereof, the number of shares held by him, and the number or designation of those series or issue to which said shares respectively belong, and the date of the issue of such series. All moneys so received shall be originally entered by the proper officer in a book to be called the cash book, to be provided by the association for the purpose, and the entries therein shall be made as to show the name or designation of the series or issues of the particular share or shares so entered, together with the amount of the dues, interest, premiums, and fines paid thereon, as the case may be. Each payment shall be classified and entered in a column devoted to its kind. Said cash book shall be closed on the last day of the month in which stated meeting is held, and shall be an exhibit of the receipt of all moneys paid by shareholders during said month. All payments made by the association for any purpose whatever shall be by order, check, or draft upon the Treasurer, signed by the President and Secretary, and indorsed by the persons in whose favor the same are drawn. The name of the payee, the amount paid, and the purpose, object, or thing for which the payment is made, together with its date, shall be entered on the margin of said order, check, or draft. The Treasurer shall dispose of and secure the safe keeping of all moneys, securities, and property of the corporation, in the manner designated by the by-laws, and the Treasurer and Secretary shall give such security for the faithful performance of their respective duties as the by-laws may direct.

SEC. 148. The profits and losses may be distributed annually, semi-annually, or quarterly, to the shares then existing, but shall be distributed at least once in each year, and whenever a new series of shares is to be issued. Profits and losses shall be distributed to the various shares existing at the time of such distribution. Losses shall be apportioned immediately after their occurrence. At each periodical distribution of profits, the Directors shall reserve, as a guaranty fund, a sum not less than one nor more than five per cent of the dues capital, which fund shall thereafter be maintained and held, and said fund shall be, at all times, available to meet losses in the business of the association from depreciation in its securities or otherwise.

SEC. 149. Any association may purchase, at any sale, public or private, any real estate upon which it may have a mortgage, judgment, lien, or other incumbrance, or in which it may have an interest, and may sell, convey, lease, or mortgage, at pleasure, the real estate so purchased, to any person or persons whatsoever. All real estate so acquired shall be sold within five years from the acquisition of title thereto.

SEC. 150. Minors may hold shares by trustees, and the shares of each shareholder, not exceeding two, shall be exempt from attachment and execution.

SEC. 151. The Bank Examiner shall perform, in reference to all loan and building associations, the same duties, and shall have the same power as are required of, or given to him, in reference to savings banks; and shall annually make report to the Legislature of such facts and statements respecting such associations, and in such form as he deems that the public interest requires. The officers of such associations shall answer truly all inquiries made, and shall make all returns required by the Bank Examiner.

APPRENTICE LAWS OF NEW YORK.

Apprentices and Employers; Consent of Legal Guardian before taking Minor as Apprentice; Indentures in Writing; by Whom Executed.

SECTION 1. On and after the passage of this Act, it shall not be lawful for any person or persons in this State to employ or take as an apprentice any minor person to learn the art or mystery of any trade or craft without first having obtained the consent of such person's legal guardian or guardians; nor shall any minor person be taken as an apprentice aforesaid unless an agreement or indenture be drawn up in writing, in accordance with the provisions of this Act, and duly executed under seal by the person or persons employing said apprentice, and also by the parents or parent, if any be living, or by the guardian or guardians of said apprentice, and likewise by said minor persons becoming an apprentice.

Contents of Indentures.

SEC. 2. Said agreement or indenture, in order to make the law valid, shall contain the following covenants and provisions:

Must be Bound for a Term of Years.

1. That said minor person shall be bound to serve his employer or employers for a term of not less than three nor more than five years.

Shall not Leave During Term of Apprenticeship; May Compel Return of Apprentice.

2. That said minor person so indentured shall not leave his said employer or employers during the term for which he shall be indentured, and if any said apprentice so indentured as aforesaid shall leave his said employer or employers, except as hereinafter provided, the said employer or employers may compel the return of said apprentice under the penalties of this Act.

Agreement of Employer in Indentures; Must give Certificate in Writing Stating Full Service of Apprenticeship.

3. That said employer or employers shall covenant and agree in said indenture to provide at all times, during the continuance of the same, suitable and proper board, lodging, and medical attendance for said apprentice, and said employer or employers shall also further covenant and agree to teach, or cause to be carefully and skillfully taught, to his or their said apprentice, every branch of his or their business to which said apprentice may be indentured, and said employer or employers shall further be bound, at the expiration of said apprenticeship, to give to said apprentice a certificate in writing, stating that said apprentice has served a full term of apprenticeship of not less than three nor more than five years at such trade or craft as may be specified in said indenture.

Non-compliance Deemed a Misdemeanor; Penalty.

SEC. 3. Any person or persons taking an apprentice without complying with the provisions of this Act, shall be deemed guilty of a misdemeanor; and on conviction thereof in the Court of Sessions, of general or special sessions, held in and for the county in which the business of said employer or employers may be conducted, shall be subject to a fine of not less than five hundred dollars, the fine to be paid to the Treasurer of said county, for the use and benefit of said county.

Indentures, How Canceled; Proceedings in Case of Violation on Part of Apprentice; Punishment for Leaving Employer; on Neglect of Apprentice to Perform his Contract, Indenture May be Canceled.

SEC. 4. Any person and all indentures made under and in pursuance of the provisions of this Act shall not be canceled or annulled before the expiration of the term of said indentures, except in case of death; or by order of, or judgment of the County or Supreme Court of this State for good cause, and any apprentice so indentured, who shall leave his employer or employers, without his or their consent, or without sufficient cause, and shall refuse to return, may be arrested upon the complaint of said employer or employers, and taken before any magistrate having jurisdiction of misdemeanors, who may cancel said indentures, and on conviction may commit said apprentice to the House of Correction, House of Refuge, or County Jail, in and for said county, for such length of time as such magistrate may deem just, or until said apprentice shall have attained the age of twenty-one years, and in case said apprentice so indentured shall willfully neglect or refuse to perform his portion of the contract as specified in said indenture, then said indenture may be canceled in the manner aforesaid, and said apprentice so violating said indentures shall forfeit all back pay and all claims against said employer or employers, and said indentures shall be canceled.

May bring Action on Failure of Employer to Provide for and Teach Apprentices; and if Proven Indentures to be Canceled and Fine Imposed.

SEC. 5. Should any employer or employers neglect or refuse to teach, or cause to be taught to said apprentice, the art or mystery of the trade or craft to which said apprentice has been indentured, or fail at any time to provide suitable and proper board, lodging, and medical attendance, said apprentice, individually, or his parent or parents guardian or guardians, may bring an action against said employer or employers, to recover damages sustained by reason of said neglect or refusal; and if proved to the satisfaction of the Court, said Court shall direct said indentures to be canceled, and may impose a fine on said employer or employers, not exceeding one thousand dollars and not less than one hundred dollars, and said fine shall be collected and paid over to said apprentice, or his parent or guardian, for his sole use and benefit.

Indentures Conflicting with this Act Invalid.

SEC. 6. Any indenture made and executed, wherein parts conflict with, or are not in accordance with the provisions of this Act, shall be invalid, and without any binding effect.

Repeal.

SEC. 7. All Acts or parts of Acts inconsistent herewith are hereby repealed

REVISED STATUTES, PART II, CHAPTER VII, ARTICLE III.

Indentures—When Invalid.

SECTION 26. No indenture or contract for the service of any apprentice shall be valid as against the person whose services may be claimed, unless made in the manner before prescribed in this title.

Duties of County Superintendents and Overseers of the Poor.

SEC. 27. The County Superintendent of the Poor, and the Overseers of the Poor of the respective cities or towns, shall be the guardians of every person bound or held in service in their respective cities or towns, to take care that the terms of the contract of service be fulfilled, and that such person be properly used; and it is hereby made their special duty to inquire into the treatment of every such person, and redress any grievance in the manner prescribed by law.

Penalty on Apprentices Absenting Themselves from Service.

SEC. 28. If any person, lawfully bound to service under either of the preceding articles of this title, shall willfully absent himself from such service, without the leave of his master, he shall be compelled to serve double the time of such absence, unless he shall otherwise make satisfaction for the loss and injury sustained by such absence; but such additional term of service shall not extend beyond three years next after the end of the original term of service.

Apprentices, etc., How Compelled to Serve.

SEC. 29. If any such person shall refuse to serve according to the provisions of this title, or the terms of his contract or indentures, his master may apply to any Justice of the Peace of the county, or to the Mayor, Recorder, or any Alderman of the city where he shall reside, who shall be authorized by warrant, or otherwise, to send for the person so refusing, and if such refusal be persisted in to commit such person by warrant to the Bridewell, House of Correction, or common jail of the city or county, there to remain until such person will consent to serve according to law.

Journeyman and Apprentices Not to be Restrained in Using their Trade.

SEC. 39. No person shall accept from any journeyman or apprentice any contract or agreement, nor cause him to be bound by oath or otherwise, that after his term of service expired, such journeyman or apprentice shall not set up his trade, profession, or employment at any particular place, shop, house, or cellar; nor any person exact from any journeyman or apprentice, after his term of service expired, any money or other thing for using and exercising his trade, profession, or employment in any place.

Penalties.

SEC. 40. Every security given contrary to the provisions contained in the last section shall be void. Any money paid or valuable thing delivered for the consideration in part or in whole of any such agreement, or using such obligation to be entered into, or exacting money or other thing as aforesaid, shall forfeit one hundred dollars to the apprentice or journeyman from whom the same shall have been received.

Application of this Title to Females.

SEC. 43. The provisions of this title shall apply as well to mistresses, female guardians, apprentices, and wards, respectively, as to masters, male guardians, apprentices, and wards.

MASSACHUSETTS LAWS.

An Act Relating to the Employment of Minors who cannot Read and Write in the English Language.

SECTION 1. Every owner, superintendent, or overseer of any manufacturing, mechanical, or mercantile establishment, who employs, or permits to be employed therein, a minor under fourteen years of age who cannot read and write in the English language, except during the vacation of the public schools in the city or town where such minor lives, and every parent or guardian who permits such employment, shall, for every such offense, forfeit not less than twenty nor more than fifty dollars, for the use of the public schools of such city or town.

SEC. 2. Every person who regularly employs, or permits to be employed, a minor, fourteen years of age, or over, who cannot read and write in the English language, providing such minor has been, since reaching the age of fourteen, continuously for one year a resident of a city or town in this commonwealth wherein public evening schools are maintained, and is not a regular attendant of a day or evening school, shall, for every such offense, forfeit not less than fifty nor more than one hundred dollars, for the use of the evening schools of such city or town.

SEC. 3. Whenever it appears that the labor of any minor, who would be debarred from employment under section two of this Act, is necessary for the support of the family to which said minor belongs, or for his own support, the school committee of said city or town may, in the exercise of their discretion, issue a permit authorizing the employment of such minor within such time or times as they may fix, and the provisions of said section two shall not apply to such minor so long as said permit is in force.

SEC. 4. Two weeks next before the opening of each term of the evening schools the school committee shall, by posters posted in three or more public places of said city or town, give notice of the location of said schools, the date of the commencement of the term, the evenings of the week during which such schools shall be kept, the provisions of section two of this Act as to forfeiture for non-compliance with said section, and such regulations as to attendance as they shall deem proper.

SEC. 5. Section seven of chapter forty-eight of the Public Statutes is hereby repealed.

SEC. 6. This Act shall take effect on the first day of October, in the year one thousand eight hundred and eighty-seven.

Approved June 16, 1887.

An Act Relating to Elevators, Hatchways, Belting, Shafting, Machinery, and for the Prevention of Accidents.

SECTION 13. The belting, shafting, gearing, and drums of all factories, when so placed as to be, in the opinion of the inspectors mentioned in section nine of chapter one hundred and three, dangerous to persons employed therein while engaged in their ordinary duties, shall be so far as practicable securely guarded. No machinery, other than steam engines, in a factory shall be cleaned while running, if objected to in writing by one of said inspectors. All factories shall be well ventilated and kept clean.

SEC. 14. The openings of all hatchways, elevators, and wellholes, upon every floor of a factory, or mercantile or public building, shall be protected by good, sufficient trapdoors, or self-closing hatches and safety catches, or such other safeguards as said inspectors direct; and all due diligence shall be used to keep such trapdoors closed at all times, except when in actual use by the occupant of the building having the use and control of the same. All elevator cabs or cars, whether for freight or passengers, shall be provided with some suitable mechanical device, to be approved by the said inspectors, whereby the cabs or cars will be securely held in the event of accident to the shipper rope, or hoisting machinery, or from any similar cause.

SEC. 15. All factories and manufacturing establishments, three or more stories in height, in which forty or more persons are employed, unless supplied with a sufficient number of tower stairways, shall be provided with sufficient fire escapes, properly constructed upon the outside thereof, and connected with the interior by doors or windows, with suitable landings at every story above the first, including the attic, if the same is occupied for workrooms. Such fire escapes will be kept in good repair and free from obstruction. Fire escapes existing on the first day of July, in the year eighteen hundred and seventy-seven, need not be changed in consequence of the provisions of this section, unless such change is necessary for the protection of life. Cities may by ordinance provide that the provisions of this section relating to fire escapes shall apply to all buildings three or more stories in height within their limits.

SEC. 16. Every room above the second story in factories or workshops, in which five or more operatives are employed, shall, except as provided in the following section, be provided with more than one way of egress by stairways on the inside or outside of the building; and such stairways shall be, as nearly as may be practicable, at opposite ends of the room. Stairways on the outside of the building shall have suitable railed landings at each story above the first, and shall connect with each story of the building by doors or windows opening outwardly; and such doors, windows, and landings shall be kept at all times clear of obstruction.

SEC. 17. A factory or workshop which, before the fifteenth day of April, in the year eighteen hundred and eighty, had proper fire escapes, in accordance with section fifteen, need not conform to the provisions of the preceding section, unless since such fire escapes were constructed there have been such changes in the building, or in the number of persons employed therein, as to make it, in the opinion of the inspectors, necessary for the protection of life.

SEC. 18. Said inspectors may accept such other provision for escape in case of fire, instead of those required in section sixteen, as may seem to them to be ample for the purpose; but women or children shall not be employed, above the second story, in a room from which there is only one way of egress.

SEC. 19. All the main doors, both inside and outside, in factories shall open outwardly, when the inspectors of factories, in writing, so direct. Each story shall be amply supplied with means for extinguishing fire.

SEC. 20. (This section prescribes means of egress from churches and public buildings, etc., and is not germane to the subject of labor, except the following concerning tenement houses.) Every building three or more stories in height, in whole or in part, used, occupied, leased, or rented for a tenement, to be occupied by more than four families, or a lodging house, shall be provided with a sufficient means of escape in case of fire, to be approved by the inspectors of factories and public buildings.

SEC. 21. No explosive or inflammable compound shall be used in any factory in such place or manner as to obstruct or render hazardous the egress of operatives in case of fire.

SEC. 22. Any person or corporation being the owner, lessee, or occupant of a manufacturing establishment, factory, or workshop, or owning or controlling the use of any building or room mentioned in section twenty, shall, for the violation of any provisions of sections thirteen to twenty-one, inclusive, be punished by a fine of not less than fifty nor more than five hundred dollars; and shall also be liable for all damages suffered by an employé by reason of such violation, until four weeks after notice in writing by an inspector of factories and public buildings of any changes necessary to be made to comply with the provisions of said sections has been sent by mail or delivered to such person or corporation; nor then, if in the meantime such changes have been made in accordance with such notification. Notice to one member of a firm, or the clerk or Treasurer of a corporation, owning, leasing, occupying, or controlling, as aforesaid, shall be deemed a sufficient notice under this section to all the members of such firm or corporation. Nothing in this section shall be so construed as to prohibit a person injured from bringing an action to recover damages for his injuries.

SEC. 23. The authority of said inspectors to enforce the provisions of sections thirteen to twenty-two, inclusive, shall not extend to the City of Boston, or to any other city, which, under its charter or any other special statute, has officers specially appointed for the enforcement of the same or similar provisions.

SEC. 24. A district police officer, detailed to perform the duties by sections thirteen to twenty-one, inclusive, who fails to perform such duties faithfully, shall be immediately discharged from his office.

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